

Daily report 09-10-2020

Analysis and prediction of COVID-19 for EU-EFTA-UK and other countries

Situation report 139

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With the financial support of



and



Foreword

The present report aims to provide a comprehensive picture of the **pandemic situation of COVID-19** in the EU countries, and to be able to foresee the situation in the next coming days. We provide some figures and tables with several **indexes and indicators** as well as an **Analysis** section that discusses a specific topic related with the pandemic.

As for the predictions, we employ an **empirical model**, verified with the evolution of the number of confirmed cases in previous countries where the epidemic is close to conclude, including all provinces of China. The model does not pretend to interpret the causes of the evolution of the cases but to permit the **evaluation of the quality of control measures made in each state** and a **short-term prediction of trends**. Note, however, that the effects of the measures' control that start on a given day are not observed until approximately 7-14 days later.

We show an individual report with 8 graphs and a summary table with the main indicators for different countries and regions. We are adjusting the model to **countries and regions** with at least 4 days with more than 100 confirmed cases and a current load over 200 cases.

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Situation and highlights

Global situation

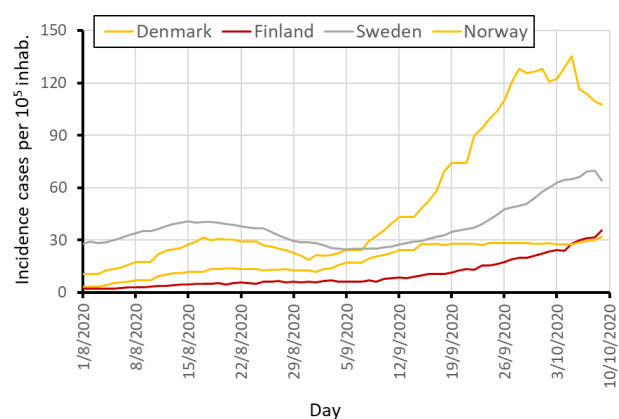
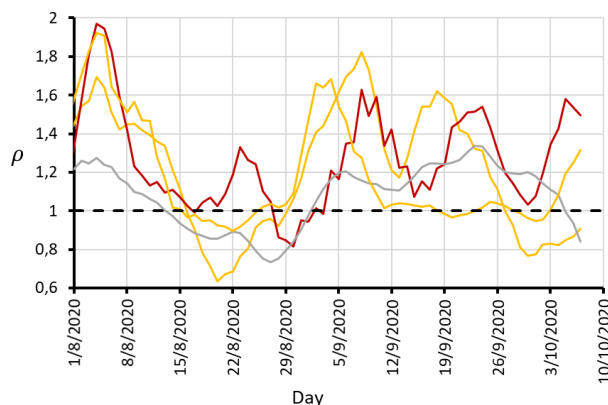
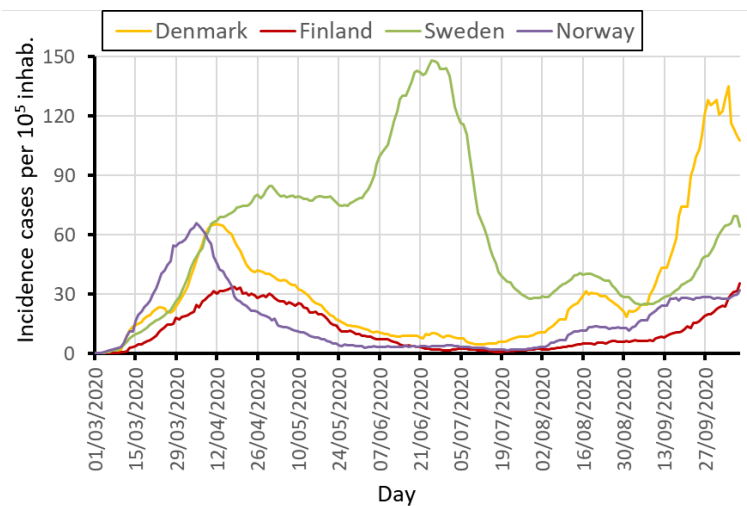
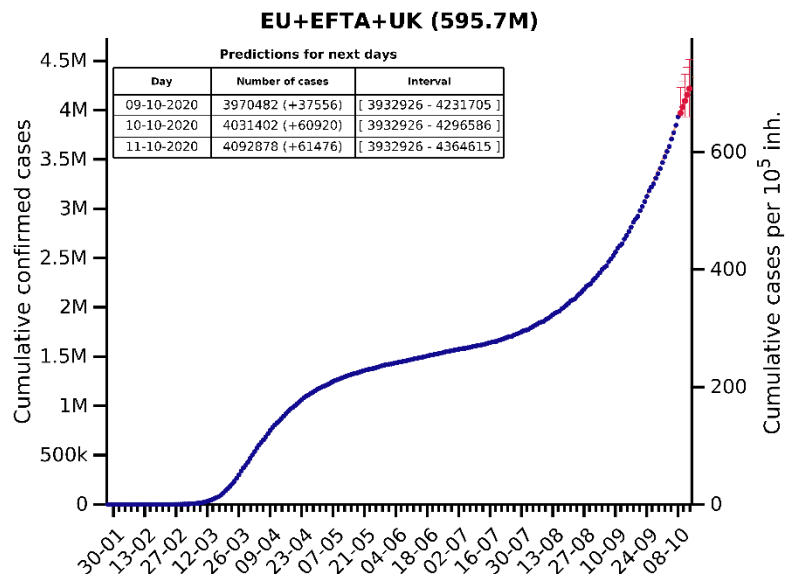
Denmark, Finland, Sweden and Norway share a region of Europe and some cultural features. They faced the first wave with different strategies. Sweden, with a soft control policy, achieved higher incidences, as seen in the figure. In early September, the incidence of Sweden was surpassed by Denmark.

We are especially interested on assessing the epidemiological behavior of these countries in recent months. We want to assess whether we can also speak of a "second wave" in these countries. We look at the period from 1/08/2020 to 7/10/2020 (see figures below).

Unfortunately, there is significant growth in all of them. Their mean ρ of this period (Denmark 1.22, Finland 1.27, Sweden 1.08, Norway 1.19) is comparable to that of other countries such as Spain or UK, although Sweden stands out positively with a lower growth rate.

However, the current incidences are still not too worrying. The highest one is found in Denmark, with an incidence above 100, but it has been declining for about two weeks. The current situation in Finland and Norway can be understood because, despite suffering considerable growth, the incident cases of 1/8/2020 was very low (Finland 2.4 per 10^5 , Norway 3.6). Denmark had a higher value (10.6) and Sweden even higher (28.0).

We can conclude that this set of countries is also suffering a second growth, but they are very far from the situation of other countries such as Spain or France.



Highlights

- Czech Republic reports the highest 14-day cumulative incidence (396 per 10⁵), with an empiric reproduction number of 1.5. These values situate the country as the one at highest risk, with an EPG close to 600. The Netherlands is also in a worrying situation (A_{14} of 307, ρ_7 of 1.3, EPG of 409).
- The list of countries with an $EPG > 100$ increases from 17 to 20, adding Poland, Croatia and Switzerland.
- United Kingdom data seem not reliable. Its indexes must be considered with caution until dataseries are validated.
- Denmark remains with a ρ_7 clearly below 1 (0.8), together with Estonia.

Situation and trends per country

Maps of current situation in EU countries. Colour scale is indicated in each legend.

- Cumulative incidence: total number of reported cases per 100,000 inhabitants
- A_{14} : Cumulative incidence last 14 days per 100,000 inhabitants (active cases)
- ρ_7 : Empiric reproduction number
- EPG: Effective Potential Growth ($EPG = A_{14} \cdot \rho_7$)

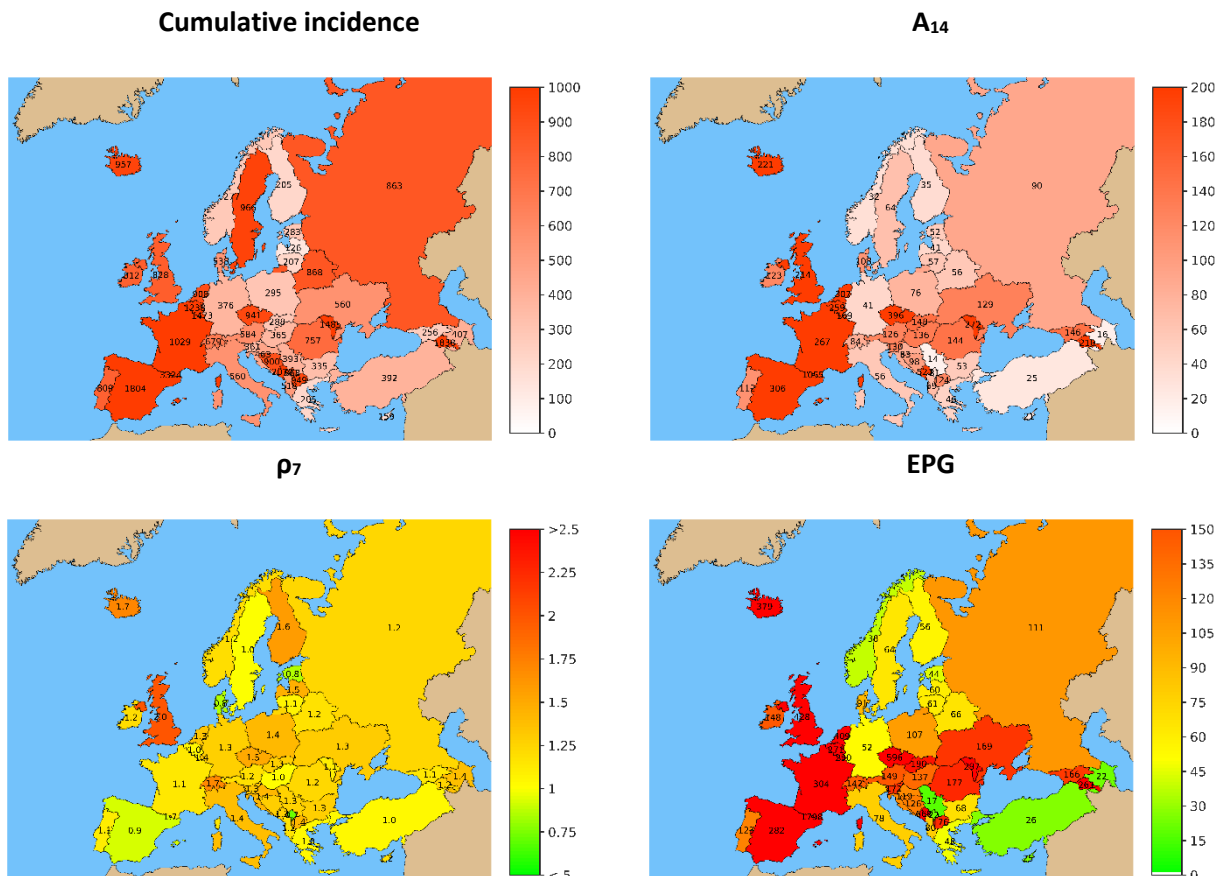


Table of current situation in EU countries. Colour scale is indicated in each legend.

Country	Reported data						Indexes		
	14-day attack rate /10 ⁵ inh.	Active cases (last 14 days)	Attack rate /10 ⁵ inh.	Cumulative cases	Mortality /10 ⁵ inh.	Cumulative deaths	$\rho_7^{(1)}$	EPG ⁽²⁾	Biocom-Cov degree
Czech Republic	395.8	42,383	940.9	100,757	8.1	869	1.50	596	9
Netherlands	307.0	52,596	908.3	155,630	38.1	6,522	1.33	409	9
Spain	306.5	144,115	1,803.9	848,324	69.5	32,688	0.92	282	9
France	267.2	174,401	1,029.0	671,638	49.8	32,521	1.14	304	9
Belgium	259.0	30,020	1,238.2	143,503	87.4	10,126	1.05	271	9
Iceland	221.2	755	957.4	3,267	2.9	10	1.71	379	9
United Kingdom	214.3	145,452	827.6	561,815	62.7	42,592	2.00	428	9
Luxembourg	169.5	1,061	1,472.7	9,219	20.6	129	1.36	230	9
Slovakia	148.3	8,097	288.0	15,726	1.0	57	1.28	190	8
Romania	143.7	27,646	757.4	145,700	27.3	5,247	1.23	177	8
Malta	137.7	608	794.0	3,506	9.3	41	1.84	253	8
Hungary	135.6	13,095	364.6	35,222	9.5	913	1.01	137	8
Slovenia	129.6	2,695	361.3	7,511	6.8	141	1.33	172	8
Austria	126.1	11,357	584.1	52,603	9.5	853	1.18	149	8
Ireland	123.4	6,092	811.8	40,086	36.8	1,817	1.20	148	8
Portugal	111.6	11,378	809.4	82,534	20.1	2,050	1.11	123	8
Denmark	107.7	6,240	537.9	31,156	11.5	665	0.85	91	7
Switzerland	83.8	7,253	678.8	58,745	20.7	1,790	1.70	142	8
Croatia	83.2	3,417	462.6	18,989	7.6	310	1.43	119	7
Poland	76.1	28,790	294.9	111,599	7.6	2,867	1.41	107	7
Sweden	64.3	6,494	965.7	97,532	58.3	5,892	1.00	64	6
Lithuania	57.1	1,555	206.6	5,625	3.7	102	1.06	61	6
Italy	56.4	34,075	559.7	338,398	59.7	36,083	1.38	78	6
Bulgaria	53.0	3,686	334.7	23,259	12.7	880	1.28	68	6
Estonia	51.6	684	283.4	3,760	5.1	67	0.85	44	6
Liechtenstein	49.8	19	356.6	136	2.6	1	2.77	138	7
Greece	45.6	4,754	205.1	21,381	4.1	430	1.04	48	6
Latvia	41.1	776	125.6	2,370	2.1	40	1.46	60	6
Germany	41.1	34,437	375.6	314,660	11.4	9,589	1.28	52	6
Finland	35.5	1,966	204.8	11,345	6.2	346	1.58	56	6
Norway	32.0	1,737	276.9	15,012	5.1	275	1.19	38	5
Cyprus	21.1	255	158.9	1,918	2.0	24	1.19	25	4

Colour scale								
>150.0	Worst	Worst	Worst	Worst	Worst	Worst	>2.0	>150
0.0	Best	Best	Best	Best	Best	Best	0.0	0

Table of current situation in some EU provinces. Colour scale is indicated in each legend.

Province	Reported data						Indexes		
	14-day attack rate /10 ⁵ inh.	Active cases (last 14 days)	Attack rate /10 ⁵ inh.	Cumulative cases	Mortality /10 ⁵ inh.	Cumulative deaths	$\rho_7^{(1)}$	EPG ⁽²⁾	Biocom-Cov degree
Madrid	682.2	45,303	3,734.3	247,985	143.1	9,500	0.74	505	9
Prague	583.3	7,420	1,665.8	21,189	NA	NA	1.39	812	9
London	126.9	11,371	650.3	58,271	NA	NA	2.03	258	8
Berlin	87.6	3,301	454.0	17,112	6.2	233	1.38	121	7
Lazio (Rome)	62.9	3,700	325.5	19,135	16.4	966	1.25	78	7

Colour scale								
>150.0	Worst	Worst	Worst	Worst	Worst	Worst	>2.0	>150
0.0	Best	Best	Best	Best	Best	Best	0.0	0

⁽¹⁾ ρ_7 is the average of 7 consecutive ρ , but can still fluctuate. ⁽²⁾ EPG stands for Effective Growth Potential, which is the product of reported cumulative incidence of last 14 days per 10⁵ inhabitants by ρ_7 (empiric reproduction number). Biocom-Cov degree is an epidemiological situation scale based on the level of last week's mean daily new cases (<https://upcommons.upc.edu/handle/2117/189661>, <https://upcommons.upc.edu/handle/2117/189808>).

Situation of hospitalisations and ICUs in some EU countries. The analysis is done for those countries that report a historical series with current (active) number of patients in hospitals and ICUs¹. We provide:

- Current active hospitalisations and patients in ICU per 100,000 inhabitants.
- Current absolute number of active hospitalisations and patients in ICU.
- Rate of occupation of curative care hospital beds by Covid-19 patients (data from Eurostat 2018²), only for hospitalisations.
- Current rate of occupation with regards to the maximum Covid-19 occupation reached in this pandemic.
- Weekly increase in Covid-19 patients in hospitals and ICUs.

Country	Hospitalisations					Intensive Care Units			
	Active /10 ⁵ inh.	Active (total)	Occupation (Eurostat 2018) (%)	Occupation (historical maximum) (%)	Week-to-week Growth (%)	Active /10 ⁵ inh.	Active (total)	Occupation (historical maximum) (%)	Week-to-week Growth (%)
France	11.7	7624	3.7	23.6	11.0	2.2	1427	20.2	14.6
Austria	10.4	935	2.0	100.0	3.0	1.5	138	46.2	8.5
Hungary	10.3	993	2.4	100.0	1.5	0.8	82	100.0	3.6
Belgium	9.1	1050	1.8	18.2	27.8	1.7	201	15.6	32.1
Portugal	7.9	801	2.4	100.0	9.0	1.1	115	50.4	7.8
Italy	7.1	4283	2.7	13.0	17.0	0.6	358	8.8	17.4
Slovakia	6.8	370	1.4	100.0	33.3	0.3	16	94.1	-2.9
Slovenia	6.6	138	1.6	100.0	33.7	1.1	22	59.5	23.4
Switzerland	2.3	201	0.7	8.9	3.3	0.4	31	8.0	20.5

Colour scale

>20%

-20%

Colour scale

>20%

-20%

¹ <https://github.com/ec-jrc/COVID-19>

² https://ec.europa.eu/eurostat/databrowser/view/hlth_rs_bds/default/table?lang=en

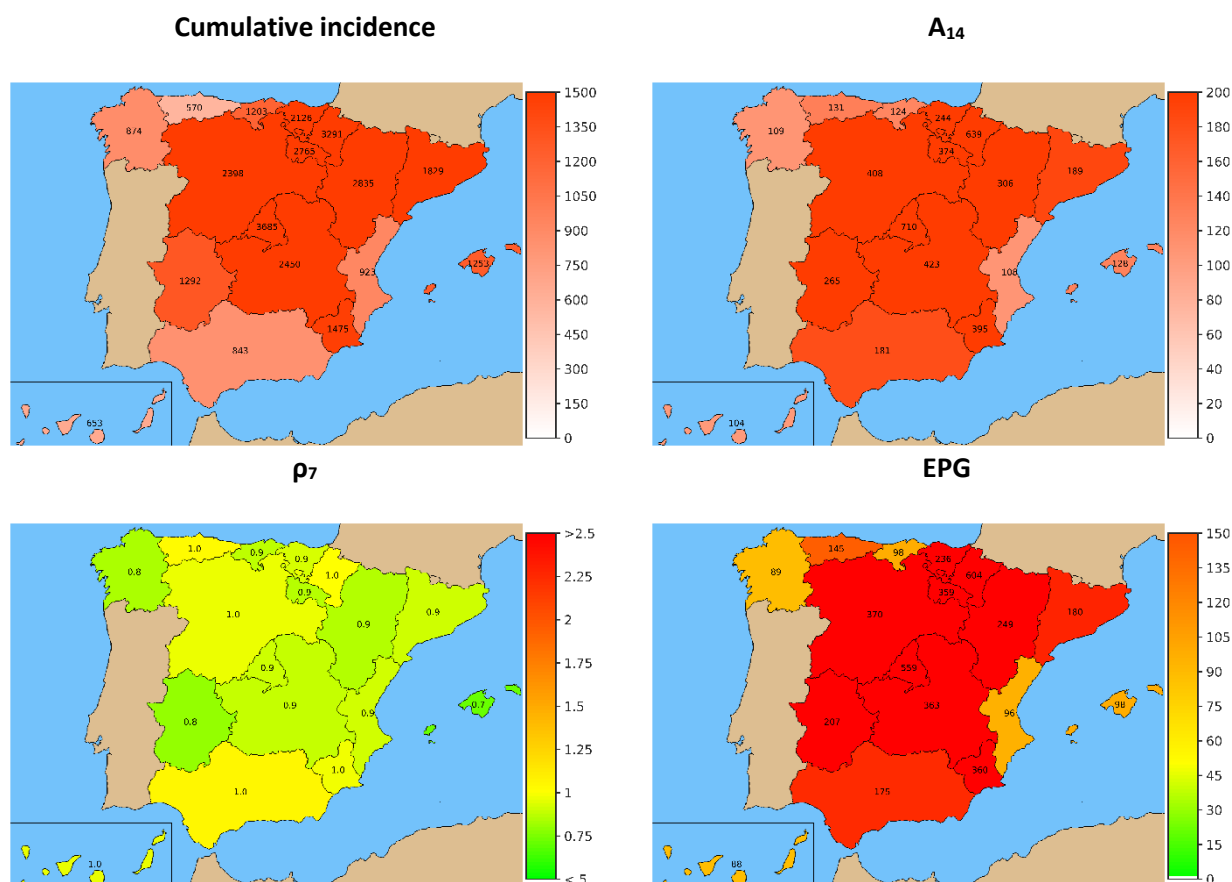
Situation and trends in some European regions³

Table of current situation in Spain regions. Colour scale is indicated in each legend.

Country	Reported data						Indexes		
	14-day attack rate /10 ⁵ inh.	Active cases (last 14 days)	Attack rate /10 ⁵ inh.	Cumulative cases	Mortality /10 ⁵ inh.	Cumulative deaths	$\rho_7^{(1)}$	EPG ⁽²⁾	Biocom-Cov degree
Madrid	682.2	45,303	3,734.3	247,985	143.1	9,500	0.74	505	9
Navarra	641.9	4,172	3,356.5	21,816	89.9	584	0.93	596	9
Melilla	443.8	376	1,384.7	1,173	5.9	5	0.96	426	9
Castilla-La Mancha	407.0	8,285	2,470.8	50,294	151.9	3,092	0.84	341	9
Castilla y Leon	404.6	9,744	2,420.8	58,296	128.0	3,083	0.90	365	9
Murcia	387.4	5,764	1,501.4	22,337	10.7	159	0.87	338	9
La Rioja	364.5	1,143	2,816.8	8,833	134.3	421	0.93	338	9
Aragon	298.4	3,941	2,854.9	37,707	105.7	1,396	0.82	245	9
Ceuta	285.2	242	915.8	777	11.8	10	1.15	329	9
Extremadura	256.0	2,727	1,311.8	13,976	55.5	591	0.82	209	9
Euskadi	242.5	5,282	2,168.1	47,222	87.9	1,915	0.94	228	9
Catalunya	194.2	14,695	1,873.2	141,707	77.4	5,854	1.01	196	9
Andalucia	177.1	14,923	851.2	71,726	21.8	1,836	0.93	164	8
Asturias	130.4	1,333	578.9	5,918	34.1	349	1.17	152	8
Cantabria	122.9	715	1,211.7	7,048	38.7	225	0.84	104	8
Baleares	122.0	1,449	1,225.2	14,553	25.8	306	0.80	97	7
Galicia	109.1	2,945	882.7	23,836	27.7	748	0.88	96	7
Comunitat Valenciana	106.3	5,287	935.7	46,546	32.5	1,618	0.87	92	7
Canarias	100.1	2,210	643.6	14,205	10.6	234	0.85	85	7

Colour scale							
>150.0	Worst	Worst	Worst	Worst	Worst	>2.0	>150
0.0	Best	Best	Best	Best	Best	0.0	0

Maps of current situation in Spanish regions. Colour scale is indicated in each legend.



³ <https://github.com/ec-jrc/COVID-19/tree/master/data-by-region>

Table of current situation in Sweden regions. Colour scale is indicated in each legend.

Country	Reported data				Indexes		
	14-day attack rate /10 ⁵ inh.	Active cases (last 14 days)	Attack rate /10 ⁵ inh.	Cumulative cases	$\rho_7^{(1)}$	EPG ⁽²⁾	Biocom-Cov degree
Uppsala	312.2	537	2,642.4	4,545	2.50	780	9
Jönköping	260.6	245	5,924.5	5,569	1.34	350	9
Örebro	205.1	320	2,087.2	3,256	2.28	468	9
Västmanland	111.7	306	1,190.5	3,262	0.51	57	6
Stockholm	109.5	2,567	1,158.7	27,161	1.29	142	8
Jämtland	93.1	121	1,060.0	1,378	1.82	170	8
Halland	92.4	304	846.2	2,784	0.97	89	7
Blekinge	90.0	144	513.8	822	1.10	99	7
Kronoberg	89.0	178	909.5	1,819	0.68	60	7
Kalmar	80.6	29	2,630.6	947	0.98	79	7
Dalarna	69.3	199	937.6	2,691	1.23	85	7
Skåne	56.0	763	470.1	6,403	0.94	53	6
Gävleborg	55.1	158	1,218.5	3,497	1.06	58	6
Västra Götaland	52.9	904	1,220.8	20,876	1.00	53	6
Östergötland	52.6	243	921.2	4,256	1.04	54	6
Norrbottn	50.8	127	734.0	1,835	1.17	59	6
Västerbotten	47.8	131	404.4	1,108	0.72	34	5
Gotland	40.7	24	594.9	351	1.67	68	6
Södermanland	30.5	78	1,007.4	2,579	1.23	37	5
Värmland	29.2	82	476.9	1,340	1.15	34	5
Västernorrland	27.8	68	804.9	1,972	1.61	45	5

Colour scale					
>150.0	Worst	Worst	Worst	>2.0	>150
0.0	Best	Best	Best	0.0	0

Table of current situation in Italy regions. Colour scale is indicated in each legend.

Country	Reported data						Indexes		
	14-day attack rate /10 ⁵ inh.	Active cases (last 14 days)	Attack rate /10 ⁵ inh.	Cumulative cases	Mortality /10 ⁵ inh.	Cumulative deaths	$\rho_7^{(1)}$	EPG ⁽²⁾	Biocom-Cov degree
Liguria	111.3	1,726	945.8	14,670	104.1	1,615	1.45	162	8
Trento	105.0	565	1,188.5	6,394	75.5	406	1.22	128	8
Campania	101.3	5,878	297.0	17,233	8.2	475	1.44	146	8
Valle d'Aosta	90.5	114	1,112.7	1,402	115.9	146	1.99	180	8
Bolzano	86.4	450	746.3	3,888	56.0	292	1.61	139	8
Umbria	83.8	739	346.6	3,057	9.9	87	1.59	133	8
Veneto	79.6	3,906	621.8	30,504	45.0	2,209	1.36	109	7
Sardegna	74.0	1,214	289.1	4,742	9.8	161	1.21	90	7
Toscana	73.5	2,740	458.3	17,095	31.4	1,173	1.80	132	7
Piemonte	64.2	2,796	863.1	37,595	95.8	4,172	1.57	101	7
Lazio	62.9	3,700	325.5	19,135	16.4	966	1.25	78	7
Friuli Venezia Giulia	62.9	764	435.4	5,290	29.2	355	1.60	101	7
Basilicata	54.4	306	177.4	997	6.2	35	0.82	44	6
Lombardia	50.9	5,120	1,101.8	110,852	168.8	16,980	1.67	85	6
Emilia-Romagna	46.7	2,081	827.9	36,914	100.8	4,493	1.51	71	6
Sicilia	44.9	2,246	174.2	8,712	6.7	333	1.22	55	6
Abruzzo	43.4	569	372.4	4,886	37.1	487	1.74	75	6
Puglia	42.7	1,722	226.3	9,116	15.0	606	1.53	65	6
Marche	35.9	548	550.8	8,399	65.0	992	1.72	62	6
Molise	22.5	69	229.1	701	8.2	25	1.27	29	4
Calabria	14.5	282	112.4	2,188	5.3	103	1.30	19	3

Colour scale					
>150.0	Worst	Worst	Worst	Worst	>2.0
0.0	Best	Best	Best	Best	0

Table of current situation in Belgium regions. Colour scale is indicated in each legend.

Country	Reported data						Indexes		
	14-day attack rate /10 ⁵ inh.	Active cases (last 14 days)	Attack rate /10 ⁵ inh.	Cumulative cases	Mortality /10 ⁵ inh.	Cumulative deaths	$\rho_7^{(1)}$	EPG ⁽²⁾	Biocom-Cov degree
Brussels	610.6	7,376	1,914.1	23,122	131.6	1,590	1.47	899	9
Wallonia	379.5	13,828	1,263.2	46,032	96.8	3,526	1.65	627	9
Flanders	194.5	12,814	1,076.2	70,914	76.0	5,008	1.31	254	9

Colour scale								
>150.0	Worst	Worst	Worst	Worst	Worst	Worst	>2.0	>150
0.0	Best	Best	Best	Best	Best	Best	0.0	0

Situation and trends in other countries

Country	Reported data						Indexes		
	14-day attack rate /10 ⁵ inh.	Active cases (last 14 days)	Attack rate /10 ⁵ inh.	Cumulative cases	Mortality /10 ⁵ inh.	Cumulative deaths	$\rho_7^{(1)}$	EPG ⁽²⁾	Biocom-Cov degree
Israel	831.1	71,935	3,308.8	286,393	21.5	1,864	0.85	705	9
Argentina	394.0	178,090	1,894.8	856,356	50.2	22,710	1.02	402	9
United States of America	189.8	628,177	2,298.0	7,606,594	64.3	212,773	1.06	201	9
Colombia	187.4	95,356	1,741.6	886,179	53.7	27,331	1.11	209	9
Brazil	174.4	370,742	2,365.7	5,028,444	70.1	148,957	0.99	172	8
Peru	150.7	49,684	2,543.4	838,614	100.4	33,098	0.77	116	8
Iraq	142.9	57,460	981.0	394,566	24.1	9,683	0.92	132	8
Ukraine	129.5	56,628	559.6	244,734	10.7	4,690	1.30	169	8
Chile	127.5	24,382	2,490.1	476,016	68.9	13,167	0.91	116	8
Qatar	103.1	2,969	4,421.8	127,394	7.6	218	0.94	97	7
Russia	90.0	131,276	863.5	1,260,112	15.1	22,056	1.23	111	7
India	80.4	1,087,581	510.4	6,906,151	7.9	106,490	0.92	74	7
Ecuador	78.8	13,899	822.1	145,045	68.8	12,141	0.92	73	7
Canada	70.1	26,465	465.2	175,559	25.3	9,557	1.20	84	7
Mexico	69.1	89,031	624.0	804,488	64.4	83,096	1.23	85	7
Iran	61.8	51,917	581.3	488,236	33.2	27,888	1.07	66	6
Belarus	56.4	5,331	867.6	81,982	9.3	880	1.17	66	6
Philippines	32.0	35,114	302.9	331,869	5.5	6,069	1.06	34	5
Indonesia	21.4	58,542	117.2	320,564	4.2	11,580	1.01	22	4
Saudi Arabia	18.0	6,275	971.3	338,132	14.3	4,972	0.95	17	3
Pakistan	3.9	8,580	143.8	317,595	3.0	6,552	0.94	4	2

Colour scale								
>150.0	Worst	Worst	Worst	Worst	Worst	Worst	>2.0	>150
0.0	Best	Best	Best	Best	Best	Best	0.0	0

⁽¹⁾ ρ_7 is the average of 7 consecutive ρ , but can still fluctuate. ⁽²⁾ EPG stands for Effective Growth Potential, which is the product of reported cumulative incidence of last 14 days per 10⁵ inhabitants by ρ_7 (empiric reproduction number). Biocom-Cov degree is an epidemiological situation scale based on the level of last week's mean daily new cases (<https://upcommons.upc.edu/handle/2117/189661>, <https://upcommons.upc.edu/handle/2117/189808>).

Analysis: Handling uncertainty in epidemiological indicators.

During this pandemic, we have focused our analyses on a basic set of indexes and indicators, in order to explain the epidemiological situation of European countries. This set has also been used to analyse the situation at a lower level: from regions to provinces and counties. The indexes that we used are based on the number of new cases reported by corresponding administrations. Nevertheless, the lower the level, the higher the inherent noise in data and, therefore, the higher the uncertainty associated to the indexes. Moreover, all relative values (e.g., 14-day cumulative incidence) may undergo huge variations when the referred population is low.

In this assessment we want to evaluate the confidence intervals for the different epidemiological indicators that we use: empirical reproduction number (ρ_7), 14-day cumulative incidence (A_{14}) and effective potential growth ($EPG = \rho_7 \cdot A_{14}$). The objective is to determine if there is any scale limitation on their use, as well as to interpret their dynamics with regards to relative population. We will use as case study a set of areas at different scales, starting from a Catalan city (Molins de Rei) and following with its immediate surroundings using different geographical levels (political and health areas). All of them are shown in Figure 1. In Table 1, size and population of each area are shown.

Table 1. Areas used to compute the epidemiological indexes. Population and size for each area are shown.

Area name	Area type	Population	Size (km ²)
Molins de Rei	City	25,868	16
Baix Llobregat Centre i Fontsa L'Hospitalet Nord	Health Care Assistance Area (medium-sized health area) – HCAA	432,011	140
Baix Llobregat	County (medium-sized political area)	818,883	490
Metropolitana Sud	Care Management Area (large health area) – CMA	1,370,709	1,400
Catalunya	Autonomous Community – AC	7,653,845	32,000

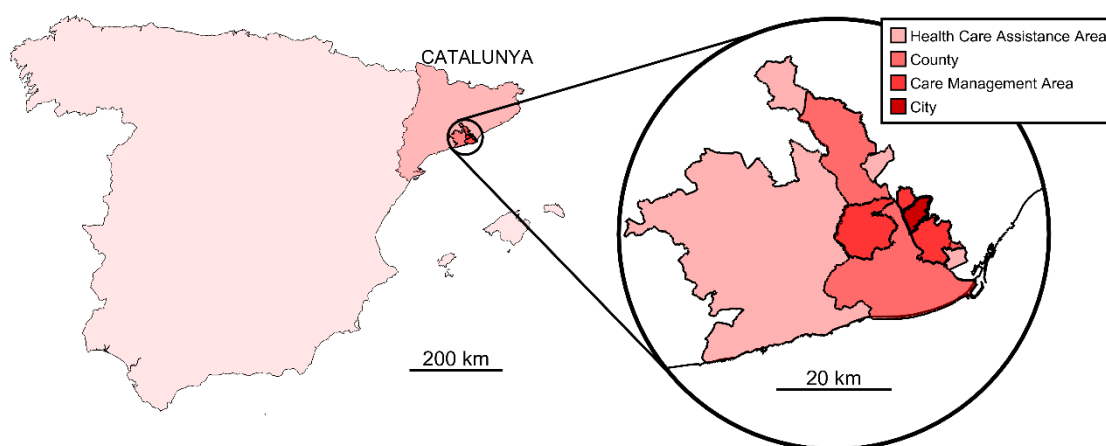


Figure 1. Location of different studied areas inside Spain.

For each area, we have assessed the dynamics of daily new cases (7-day moving average) and the epidemiological indexes, using data using data from official sources. Figure 2 shows the evolution of all indicators for the last month.

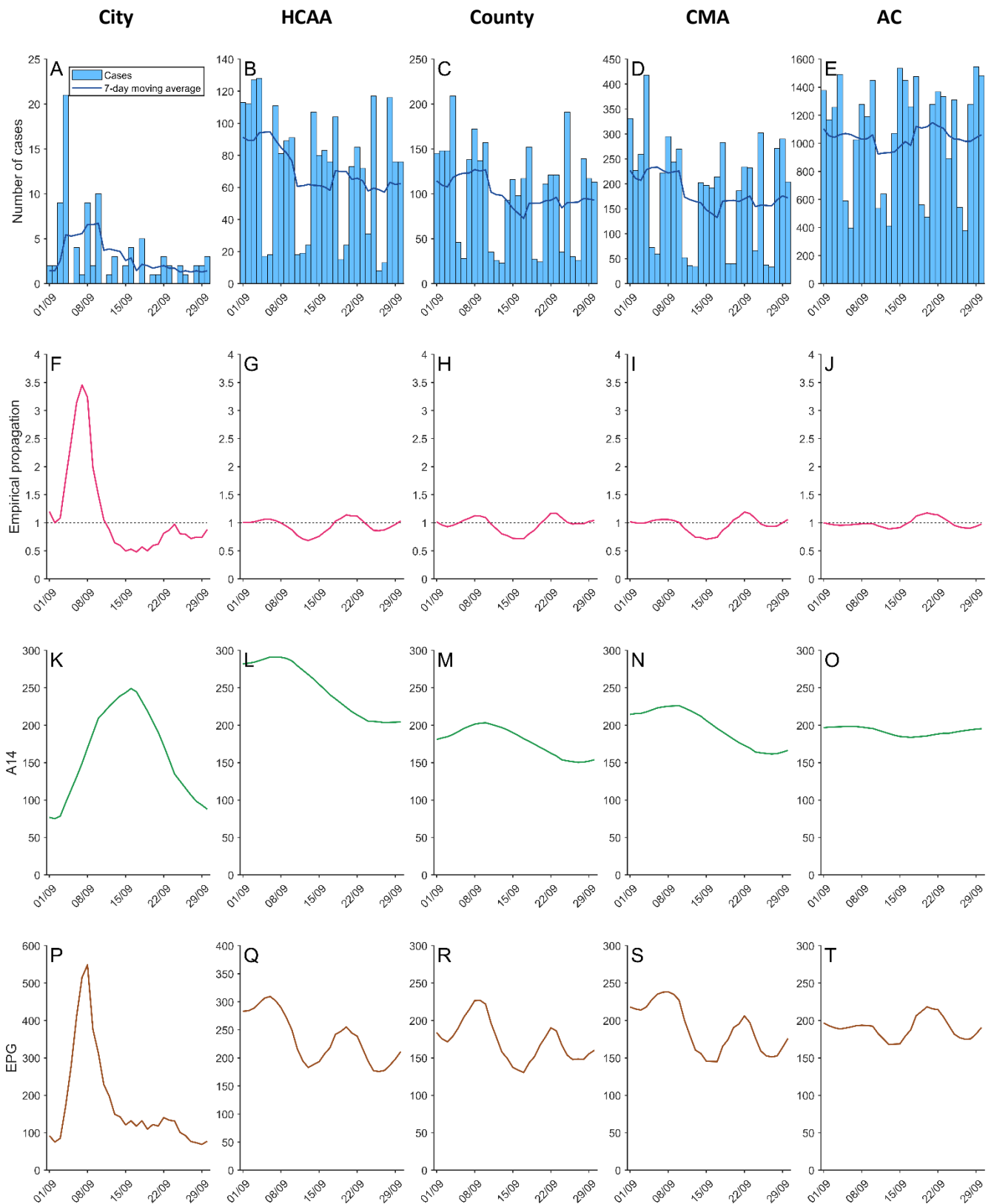


Figure 2. Epidemiological indicators in different areas. A-E Light blue bars: reported daily new cases; darker blue line: 7-day moving average of new cases. F-J Empirical reproduction number (p_7). K-O 14-day cumulative incidence (A_{14}). P-T Effective potential growth (EPG). City: Molins de Rei; HCAA: Health Care Assistance Area (medium-sized health area); County: Baix Llobregat; CMA: Care Management Area (large-sized health area); AC: Catalunya. Data from official databases⁴.

⁴ <https://analisi.transparenciacatalunya.cat/Salut/Registre-de-casos-de-COVID-19-realitzats-a-Catalun/qwj8-xpvk>
<https://analisi.transparenciacatalunya.cat/Salut/Dades-di-ries-de-COVID-19-per-rees-de-gesti-assist/dmzh-fz47>

Assessment of the confidential intervals

We can consider case detection to follow a binomial probability (other distributions can be considered obtaining similar results). Let us illustrate it with two examples:

- 1) We detect 10 cases in a population of 10,000 inhabitants. Incidence probability distribution and its confidence intervals are shown in Figure 3A, 3B.
- 2) We detect 1 case in a population of 10,000 inhabitants. Incidence probability distribution and its confidence intervals are shown in Figure 3C, 3D.

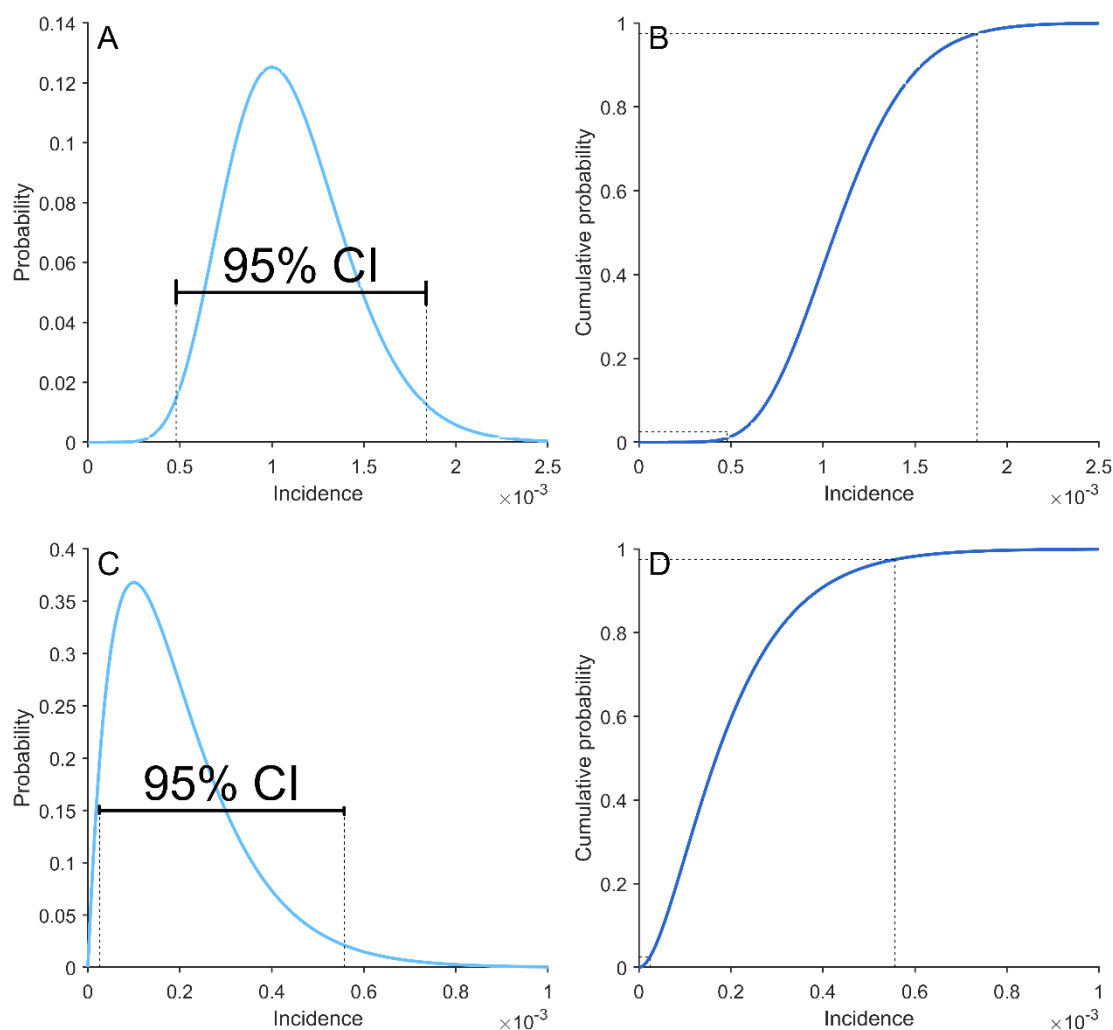


Figure 3. Possible incidences given a certain measurement. A Probability density function for a detection of 10 cases in 10,000 inhabitants. **B** Cumulative probability density function for a detection of 10 cases in 10,000 inhabitants. **C** Probability density function for a detection of 1 case in 10,000 inhabitants. **D** Cumulative probability density function for a detection of 1 case in 10,000 inhabitants.

Using the binomial approximation, we can compute a 95% confidence interval for the measured number of new cases. Then, using propagation of errors theory, we can compute the confidence intervals of main indicators.

Let us recall the definition of all indicators (Table 2). Using theory of propagation of errors,

$$z = f(x, y) \rightarrow \sigma_z^2 = \left(\frac{\partial f(x, y)}{\partial x} \right)^2 \sigma_x^2 + \left(\frac{\partial f(x, y)}{\partial y} \right)^2 \sigma_y^2,$$

and assuming constant incidences we can obtain the uncertainties included in Table 2 (see appendix for detailed calculations).

Table 2. Description and equation of assessed indicators and indexes, together with the evaluation of their uncertainty assuming constant incidence (see appendix).

	Equation	Uncertainty
7-day moving average of new cases	$c = \frac{n_0 + n_1 + n_2 + n_3 + n_4 + n_5 + n_6}{7}$	$\sigma_c \approx \frac{1}{\sqrt{7}} \sigma_n$
14-day cumulative incidence	$A_{14} = \frac{c_0 + c_1 + c_2 + \dots + c_{13}}{\text{population}} \cdot 10^5$	$\sigma_{A_{14}} \approx \frac{10^5 \cdot \sqrt{2}}{\text{population}} \sigma_n$
Empirical reproduction number	$\rho = \frac{c_0 + c_1 + c_2}{c_5 + c_6 + c_7}$	$\sigma_\rho \approx \frac{\sqrt{6}}{3 \cdot \sqrt{7} \cdot n} \sigma_n$
Effective potential growth	$EPG = \rho \cdot A_{14}$	$\sigma_{EPG} \approx \sqrt{\frac{62}{3} \cdot \frac{10^5}{\text{population}}} \sigma_n$

Assuming Gaussian approximation ($\sigma_n \approx 1.96 \sqrt{n}$), we can obtain a good analytical approximation for the uncertainties, in order to have an idea of their magnitude and behaviour:

$$\frac{\sigma_c}{c} \approx \frac{0.7408}{\sqrt{n}} \approx \frac{0.7408}{\sqrt{\text{inc} \cdot \text{pop}}}$$

$$\frac{\sigma_{A_{14}}}{A_{14}} \approx \frac{0.1980}{\sqrt{n}} \approx \frac{0.1980}{\sqrt{\text{inc} \cdot \text{pop}}}$$

$$\frac{\sigma_\rho}{\rho} \approx \frac{0.6049}{\sqrt{n}} \approx \frac{0.6049}{\sqrt{\text{inc} \cdot \text{pop}}}$$

$$\frac{\sigma_{EPG}}{EPG} \approx \frac{0.6364}{\sqrt{n}} \approx \frac{0.6364}{\sqrt{\text{inc} \cdot \text{pop}}}$$

It is important to notice that:

Confidence intervals are reduced with the square root of the incidence and population. **The bigger the population and the higher the incidence (of new cases), the narrower the confidence intervals.**

In figure 4, we plot epidemiological indicators with their confidence intervals. Note that confidence intervals were computed using the binomial uncertainties instead of the Gaussian analytical approximation.

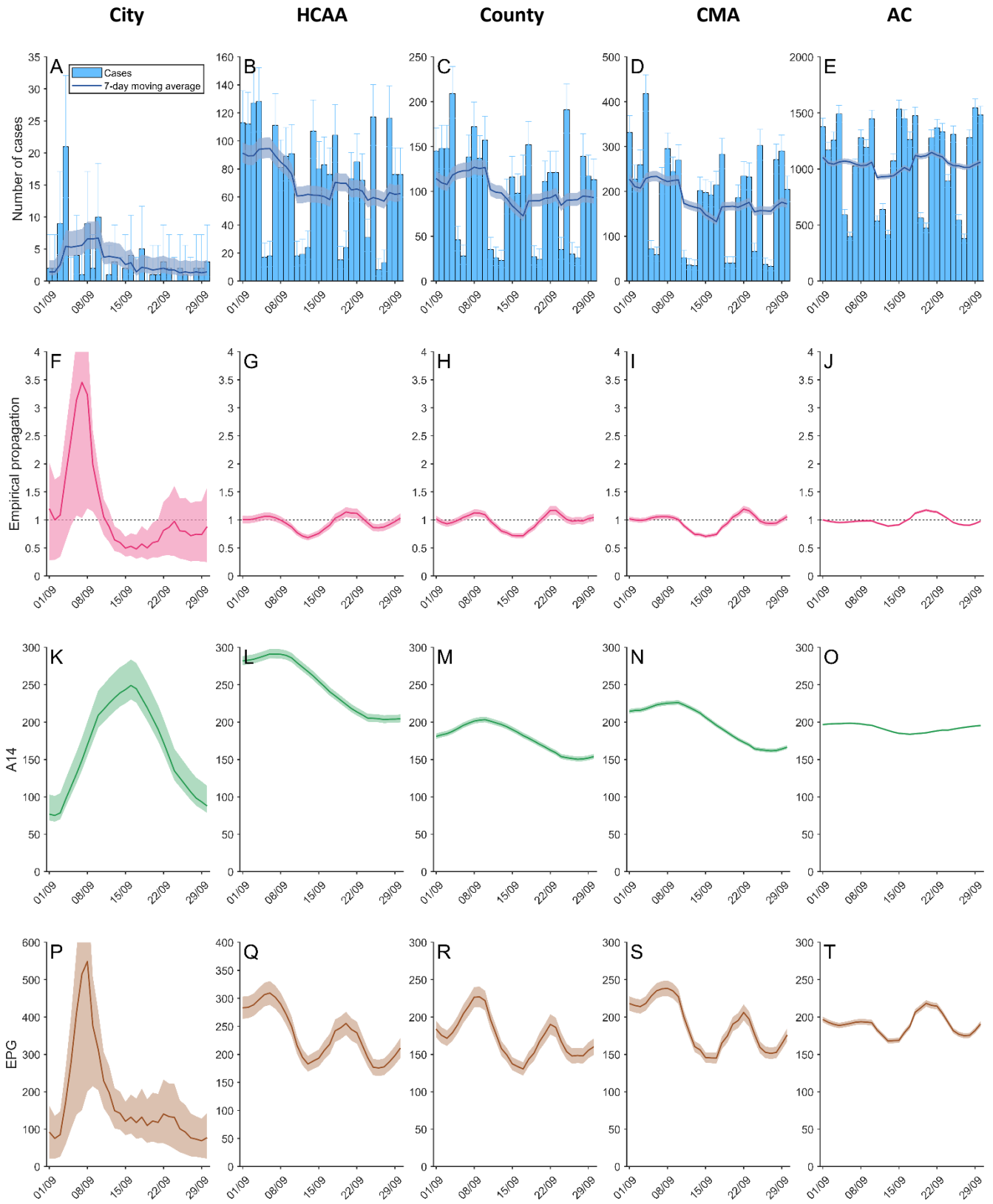


Figure 4. Epidemiological indicators at different areas with 95% confidence intervals. A-E Light blue bars: reported daily new cases; darker blue line: 7-day moving average of new cases. F-J Empirical reproduction number (p_7). K-O 14-day cumulative incidence (A_{14}). P-T Effective potential growth (EPG). City: Molins de Rei; HCAA: Health Care Assistance Area (medium-sized health area); County: Baix Llobregat; CMA: Care Management Area (large-sized health area); AC: Catalunya.

Assessment of the population threshold for an uncertainty below 10%

Some calculations can be performed using the analytical approximations. Assuming a constant incidence of $A_{14}=100$ cases per 100,000 inh., we compute which must be the population size in order to have a confidence interval smaller to the 10%:

$$\frac{\sigma_c}{c} \approx \frac{0,7408}{\sqrt{\frac{100}{14 \cdot 10^5} \cdot pop}} = 0,10 \rightarrow pop \approx 770,000$$

$$\frac{\sigma_{A_{14}}}{A_{14}} \approx \frac{0,1980}{\sqrt{\frac{100}{14 \cdot 10^5} \cdot pop}} = 0,10 \rightarrow pop \approx 56,000$$

$$\frac{\sigma_\rho}{\rho} \approx \frac{0,6049}{\sqrt{\frac{100}{14 \cdot 10^5} \cdot pop}} = 0,10 \rightarrow pop \approx 500,000$$

$$\frac{\sigma_{EPG}}{EPG} \approx \frac{0,6364}{\sqrt{\frac{100}{14 \cdot 10^5} \cdot pop}} = 0,10 \rightarrow pop \approx 560,000$$

These results can also be computed numerically, as shown in Table 3 and in Figure 5. They are also assessed for an A_{14} of 200 cases per 100,000 inh.

Table 3. Minimum population sizes need to have an uncertainty smaller than 10% in epidemiological indicators and indexes. Two different constant incidences are considered ($A_{14} = 100$ and $A_{14} = 200$). Populations sizes are obtained numerically and with analytical approximations.

	$A_{14} = 100$		$A_{14} = 200$	
	numerically	approximation	numerically	approximation
7-day moving average in new cases (c)	820,000	770,000	410,000	380,000
Empiric reproduction number (ρ)	560,000	510,000	280,000	260,000
14-day cumulative incidence (A_{14})	70,000	56,000	36,000	28,000
Effective potential growth (EPG)	610,000	570,000	310,000	280,000

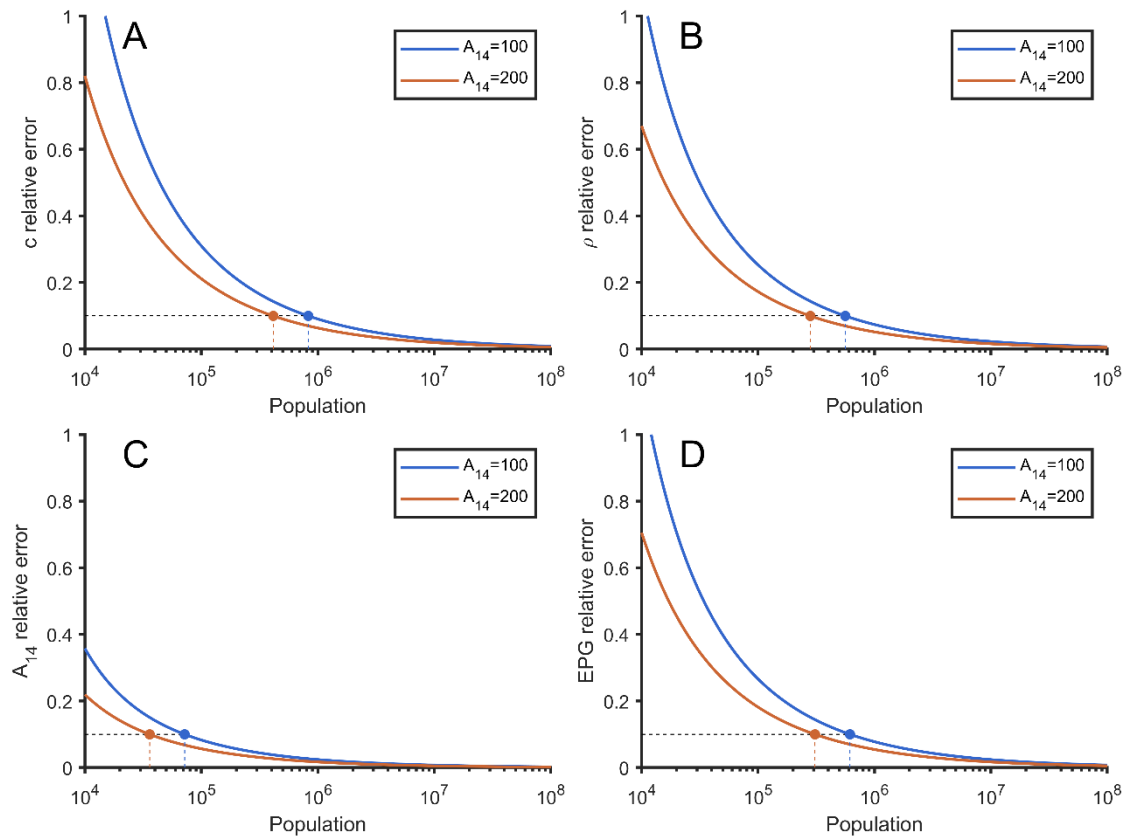


Figure 5. Relative errors of different epidemiological indicators. Blue line is plotted considering a constant $A_{14}=100$, and red line is assessed considering a constant $A_{14}=100$. **A** 7-day moving average (c). **B** Empirical propagation (ρ_7). **C** 14-day cumulative incidence (A_{14}). **D** Effective Potential Growth (EPG).

Conclusions

- Confidence intervals are reduced with the square root of the incidence and population. **Population size and incidence are inversely associated with confidence interval width.**
- Indicators are **always important to detect** a sudden increase in number of cases and the incidence trend in any area, independently of its size.
- Population size must be considered to put values in context and interpret their meaning. When population is small, it is important to know that indicator strict value is just an **approximation with big uncertainty intervals**, their trend becoming the important matter.

Appendix

Confidence interval for the 7-day moving average of daily new cases:

$$c = \frac{n_0 + n_1 + n_2 + n_3 + n_4 + n_5 + n_6}{7}$$

$$\sigma_c^2 = \left(\frac{1}{7}\right)^2 \sigma_{n_0}^2 + \left(\frac{1}{7}\right)^2 \sigma_{n_1}^2 + \left(\frac{1}{7}\right)^2 \sigma_{n_2}^2 + \left(\frac{1}{7}\right)^2 \sigma_{n_3}^2 + \left(\frac{1}{7}\right)^2 \sigma_{n_4}^2 + \left(\frac{1}{7}\right)^2 \sigma_{n_5}^2 + \left(\frac{1}{7}\right)^2 \sigma_{n_6}^2$$

$$\sigma_{n_i}^2 \approx \left(\frac{1}{7}\right)^2 \sigma_n^2 \quad c \approx n$$

$$\sigma_c^2 \approx \left(\frac{1}{7}\right)^2 \cdot 7 \cdot \sigma_n^2 \rightarrow \sigma_c \approx \frac{1}{\sqrt{7}} \sigma_n \approx 0.7408 \cdot \sqrt{n}$$

$$\frac{\sigma_c}{c} \approx \frac{0.7408}{\sqrt{n}}$$

Confidence interval for the 14-day cumulative incidence:

$$A_{14} = \frac{c_0 + c_1 + c_2 + \dots + c_{13}}{\text{population}} \cdot 10^5$$

$$\sigma_{A_{14}}^2 = \left(\frac{10^5}{\text{pop}}\right)^2 (\sigma_{c_0}^2 + \sigma_{c_1}^2 + \dots + \sigma_{c_{13}}^2)$$

$$\sigma_{A_{14}}^2 \approx \left(\frac{10^5}{\text{pop}}\right)^2 \cdot \frac{14}{7} \sigma_n^2 \rightarrow \sigma_{A_{14}} \approx \frac{10^5}{\text{pop}} \cdot 2.7719 \cdot \sqrt{n}$$

$$\frac{\sigma_{A_{14}}}{A_{14}} \approx \frac{\frac{10^5}{\text{pop}} \cdot 2.7719 \cdot \sqrt{n}}{14n \cdot \frac{10^5}{\text{pop}}} = \frac{0.1980}{\sqrt{n}}$$

Confidence interval for empirical propagation (ρ_7):

$$\rho = \frac{c_0 + c_1 + c_2}{c_5 + c_6 + c_7}$$

$$\sigma_\rho^2 = \left(\frac{1}{c_5 + c_6 + c_7}\right)^2 (\sigma_{c_0}^2 + \sigma_{c_1}^2 + \sigma_{c_2}^2) + \left(\frac{\rho}{c_5 + c_6 + c_7}\right)^2 (\sigma_{c_5}^2 + \sigma_{c_6}^2 + \sigma_{c_7}^2)$$

$$\sigma_\rho^2 \approx \left(\frac{1}{3n}\right)^2 \cdot 6 \cdot \sigma_c^2 = \left(\frac{1}{3n}\right)^2 \cdot \frac{6}{7} \cdot \sigma_n^2 \rightarrow \sigma_\rho \approx \frac{0.6049}{\sqrt{n}}$$

$$\frac{\sigma_\rho}{\rho} \approx \frac{0.6049}{\sqrt{n}}$$

Confidence intervals for Effective Potential Growth (EPG):

$$EPG = \rho \cdot A_{14}$$

$$\sigma_{EPG}^2 = \rho^2 \cdot \sigma_{A_{14}}^2 + A_{14}^2 \cdot \sigma_\rho^2$$

$$\sigma_{EPG}^2 \approx \left(\frac{10^5}{\text{pop}}\right)^2 \cdot \frac{14}{7} \sigma_n^2 + \left(14n \cdot \frac{10^5}{\text{pop}}\right)^2 \cdot \left(\frac{1}{3n}\right)^2 \cdot \frac{6}{7} \cdot \sigma_n^2 = \left(\frac{10^5}{\text{pop}}\right)^2 \frac{62}{3} \cdot \sigma_n^2$$

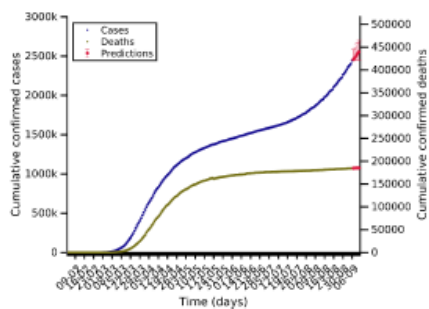
$$\sigma_\rho \approx \frac{10^5}{\text{pop}} \cdot 8.9103 \cdot \sqrt{n}$$

$$\frac{\sigma_{EPG}}{EPG} \approx \frac{\frac{10^5}{\text{pop}} \cdot 8.9103 \cdot \sqrt{n}}{14n \cdot \frac{10^5}{\text{pop}}} = \frac{0.6364}{\sqrt{n}}$$

Legend: Countries' reports details

Reported cumulative cases (blue) and deaths (brown), together with predictions (red)

EU+EFTA+UK 06-09-2020. Pop: 2632.4M. Cumulative incidence: 93/10⁵

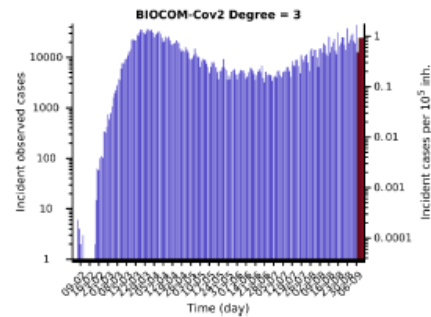
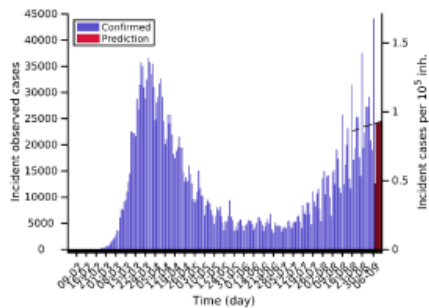


Predictions for next days		
Day	Number of cases	95% confidence interval
07-09-2020	2458068 (+125771)	[2445493 - 2583840]
09-09-2020	2568527 (+242758)	[2443493 - 2633890]
11-09-2020	2553558 (+244355)	[2445493 - 2799209]

Current indicators		
R_{eff}	RPI	CFR
1.3	14	1.17 %

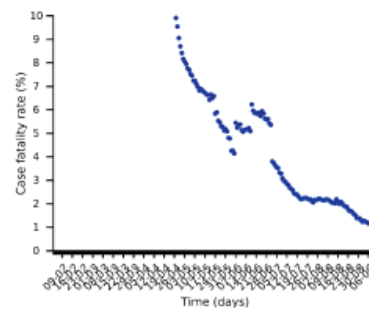
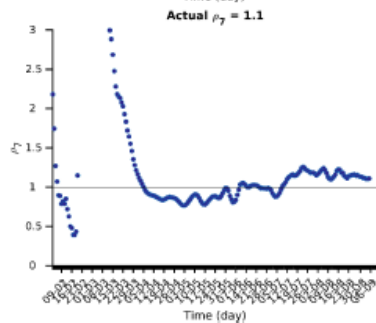
Predictions and indicators

Incident observed cases and predictions.



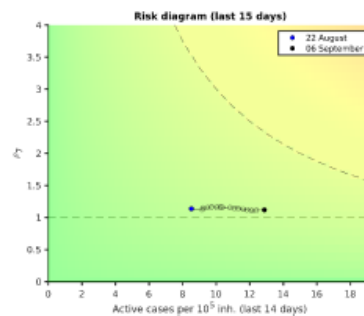
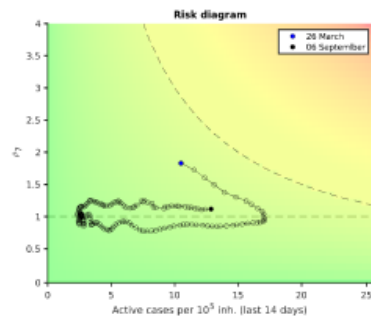
Incident observed cases in a logarithmic scale, with Biocom-Cov degree.

Evolution of empiric reproduction number ρ_T



Case fatality rate

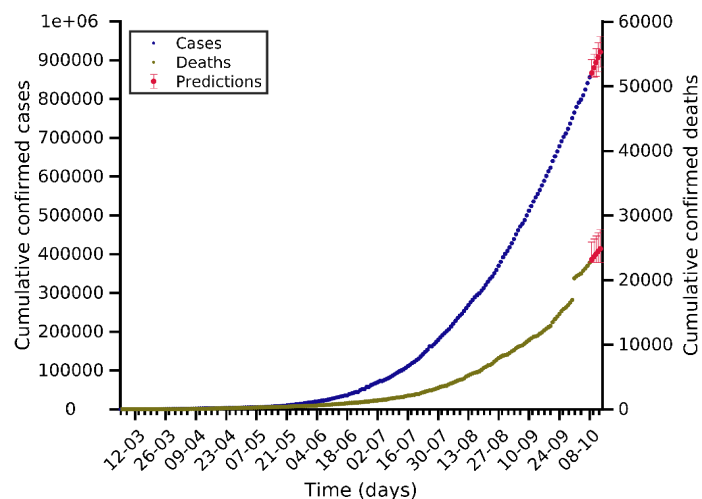
Risk diagram



Risk diagram of last 15 days

**(1) Analysis and prediction of COVID-19
for EU+EFTA+UK**

EU+EFTA+UK 08-10-2020. Pop: 527.9M. Cumulative incidence: 745/10⁵

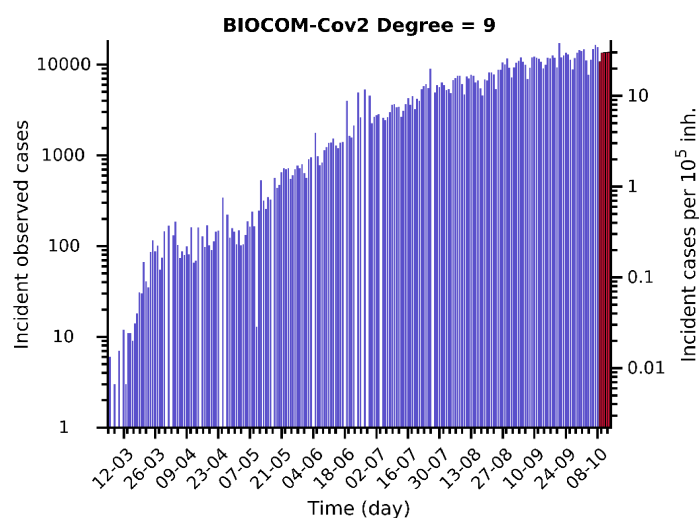
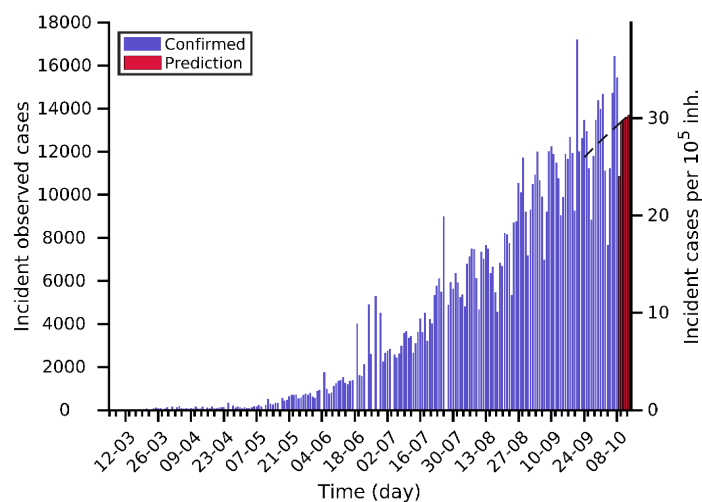


Predictions for next days

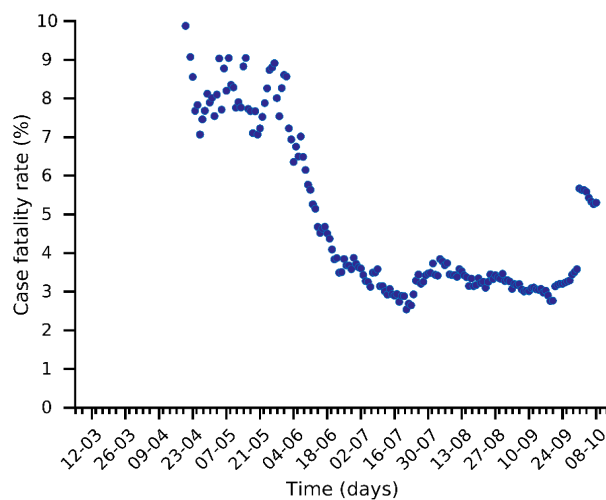
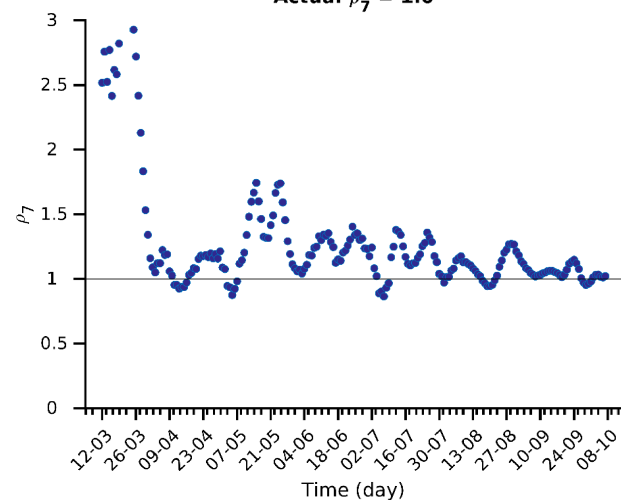
Day	Number of cases	95% Confidence Interval
09-10-2020	867198 (+10842)	[856356 - 901617]
11-10-2020	894107 (+13503)	[858199 - 930014]
13-10-2020	921397 (+13692)	[882189 - 960605]

Current indicators

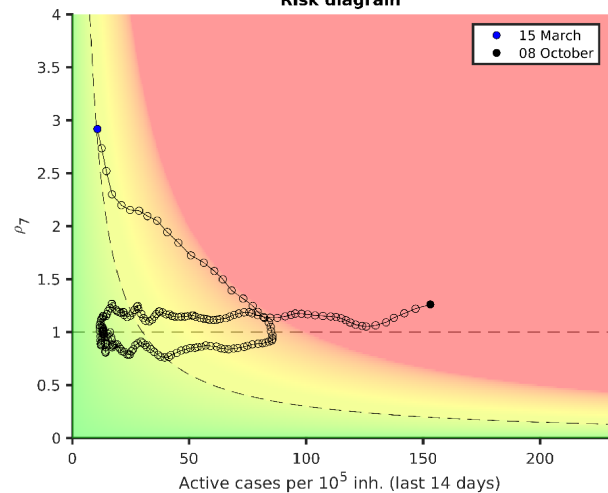
A ₁₄	EPG	CFR
394	402	5.30 %



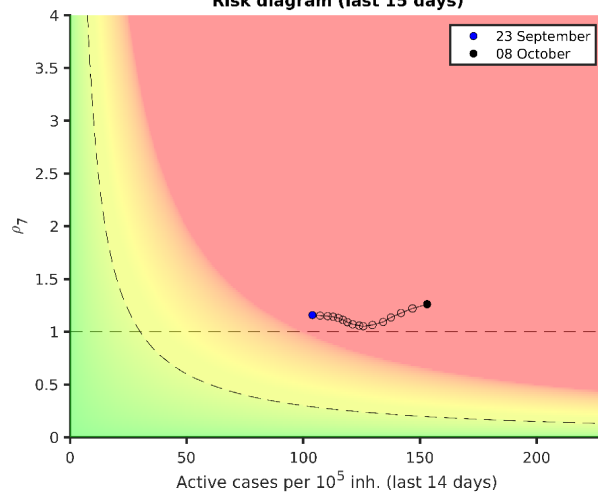
Actual $\rho_7 = 1.0$



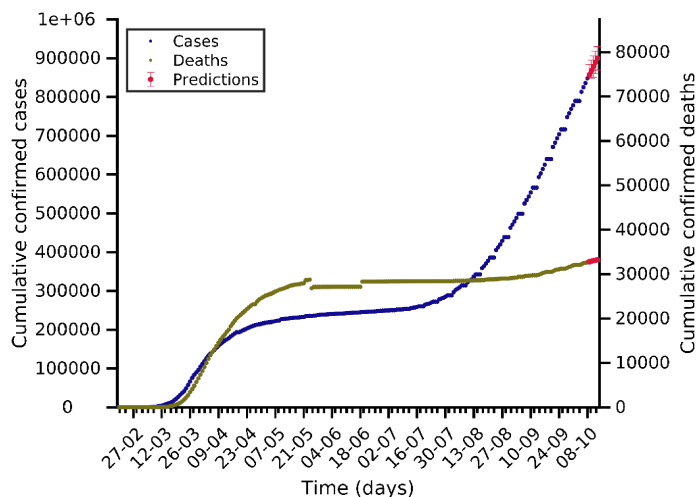
Risk diagram



Risk diagram (last 15 days)



Spain 08-10-2020. Pop: 47.0M. Cumulative incidence: 1804/10⁵

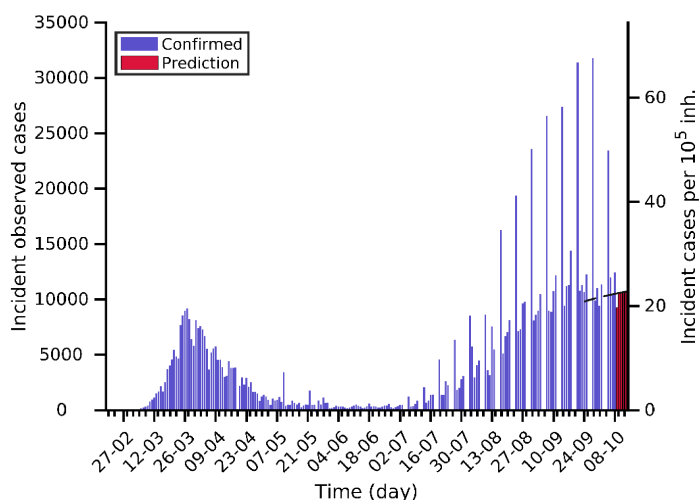


Predictions for next days

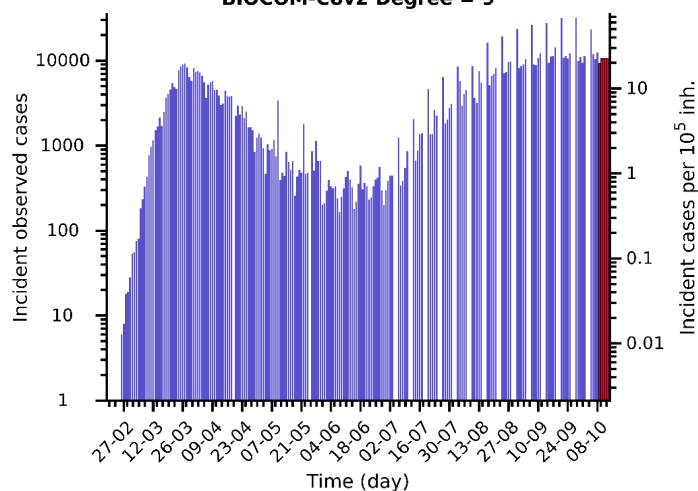
Day	Number of cases	95% Confidence Interval
09-10-2020	857594 (+9270)	[848324 - 884161]
11-10-2020	878811 (+10629)	[851137 - 906486]
13-10-2020	900185 (+10706)	[870091 - 930279]

Current indicators

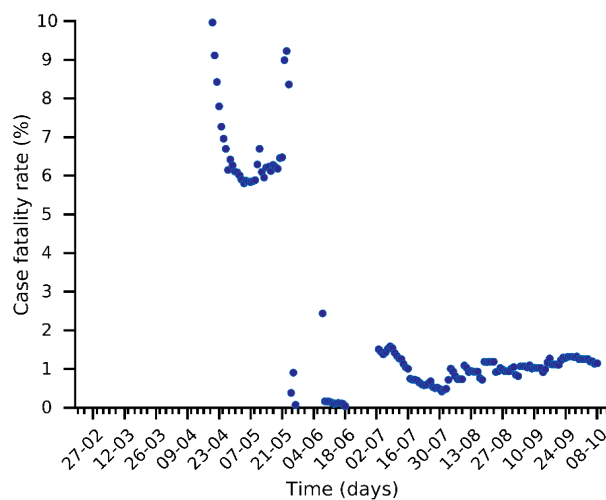
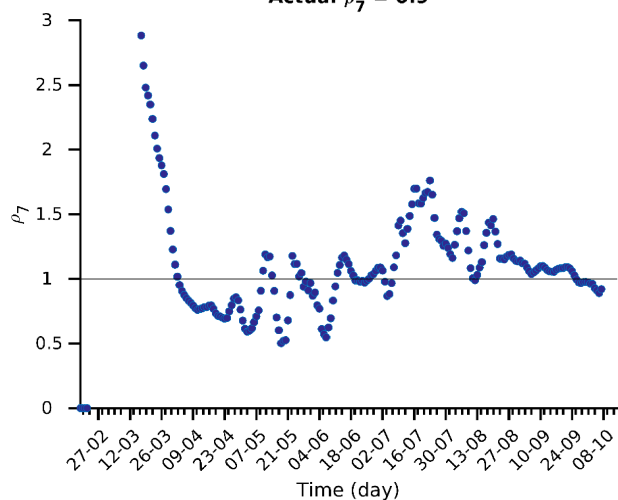
A ₁₄	EPG	CFR
306	282	1.14 %



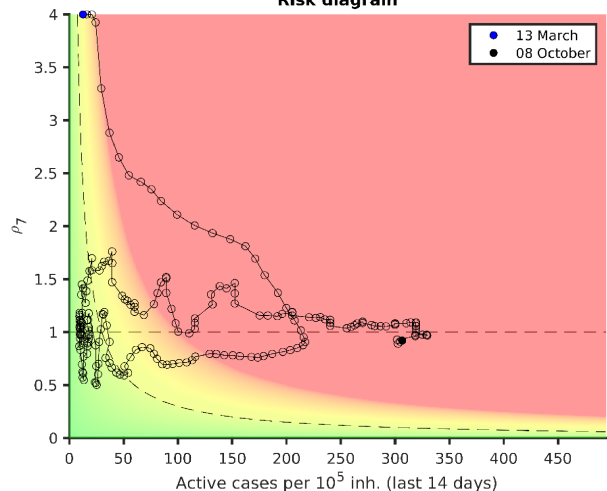
BIOCOM-Cov2 Degree = 9



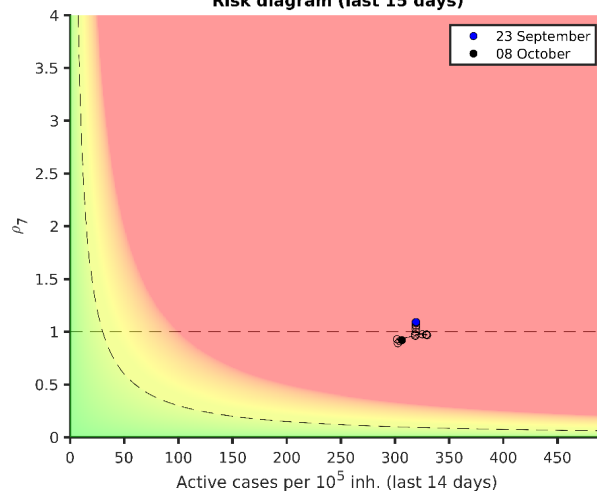
Actual $\rho_7 = 0.9$



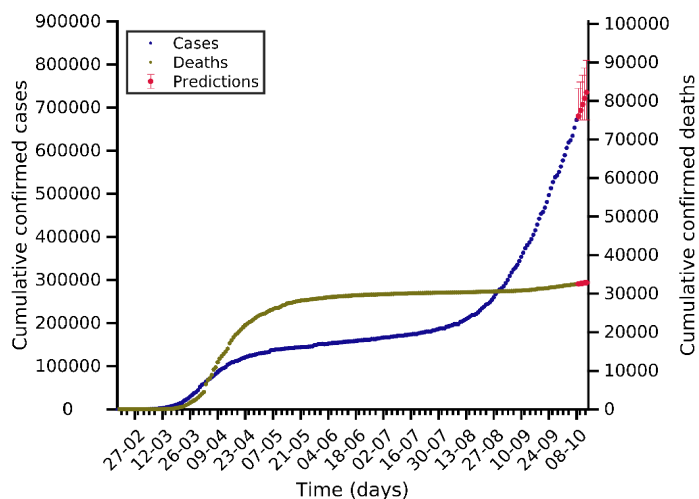
Risk diagram



Risk diagram (last 15 days)



France 08-10-2020. Pop: 65.3M. Cumulative incidence: 1029/10⁵

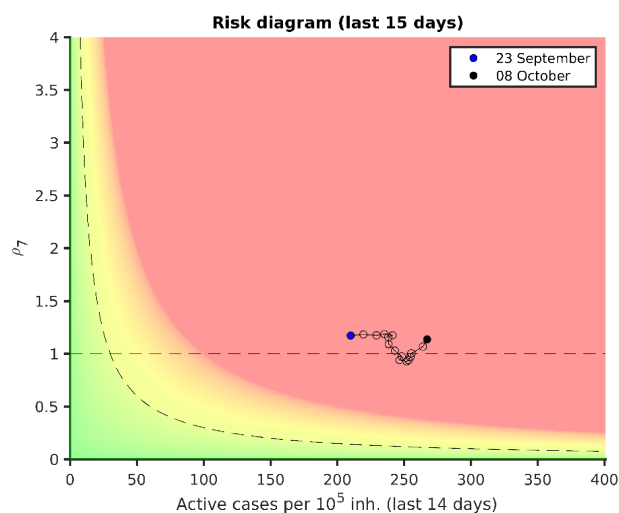
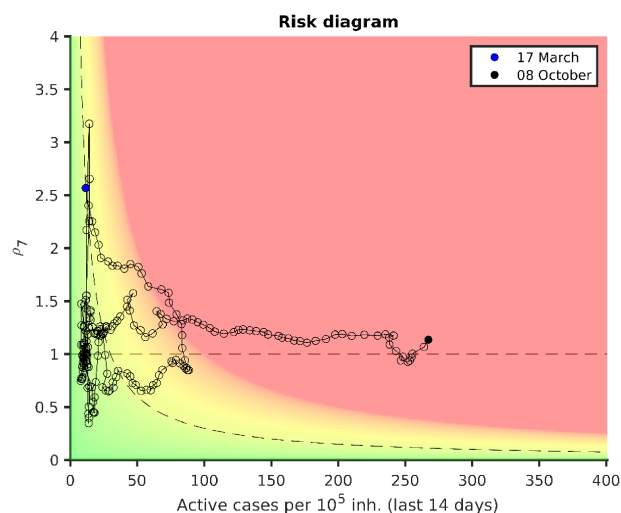
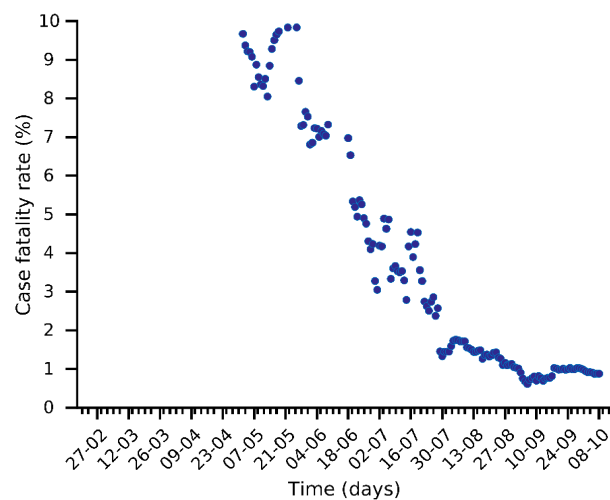
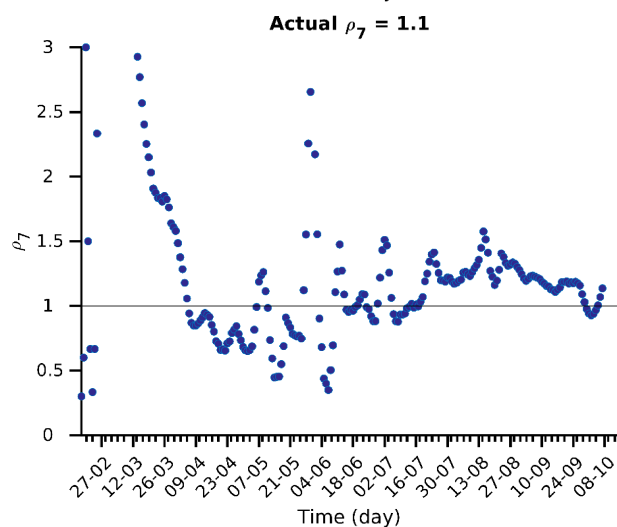
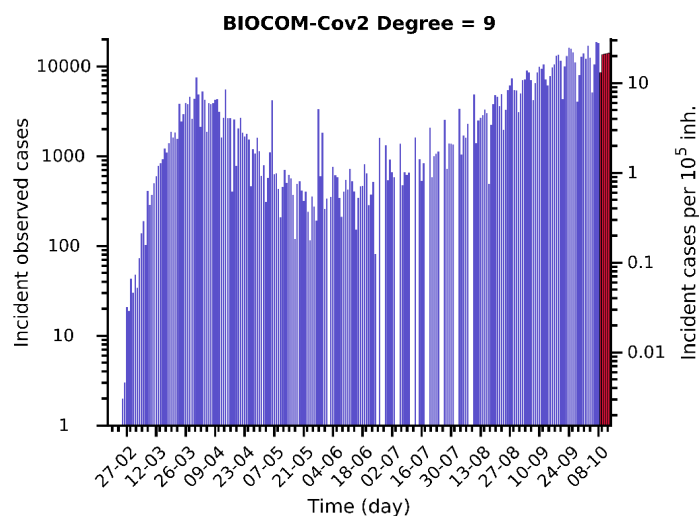
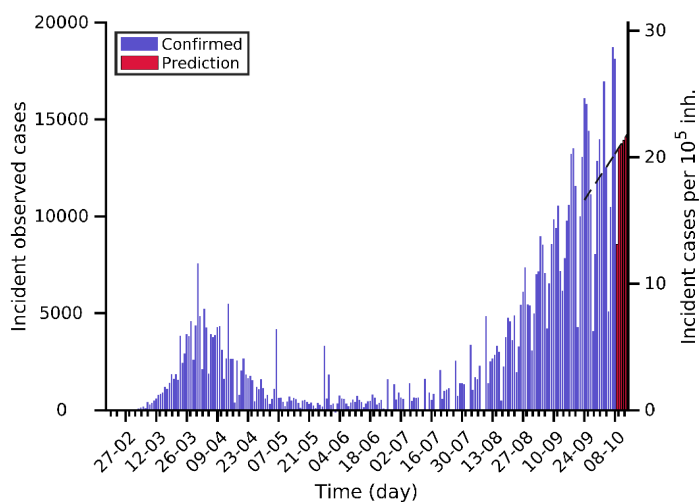


Predictions for next days

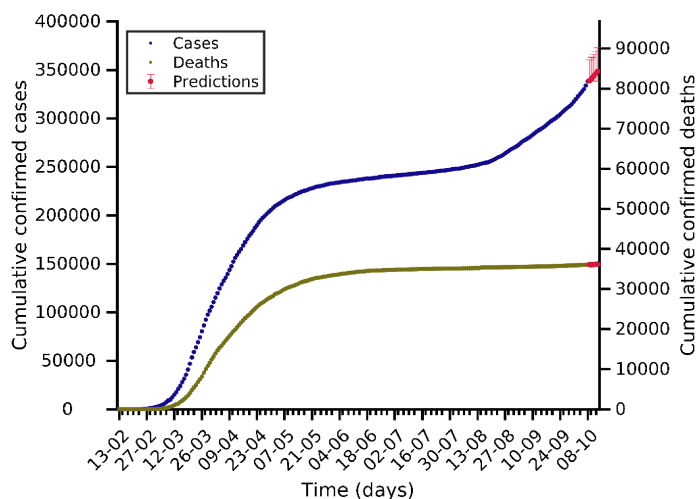
Day	Number of cases	95% Confidence Interval
09-10-2020	680194 (+8556)	[671638 - 744970]
11-10-2020	707521 (+13751)	[671638 - 775265]
13-10-2020	735550 (+14103)	[671638 - 810029]

Current indicators

A ₁₄	EPG	CFR
267	304	0.88 %



Italy 08-10-2020. Pop: 60.5M. Cumulative incidence: 560/10⁵

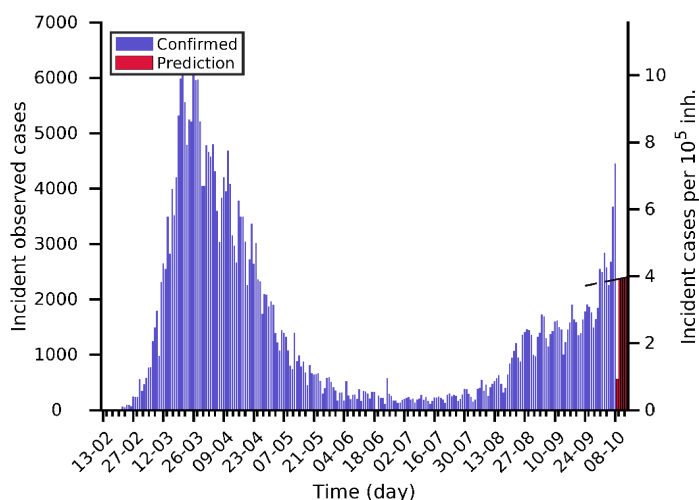


Predictions for next days

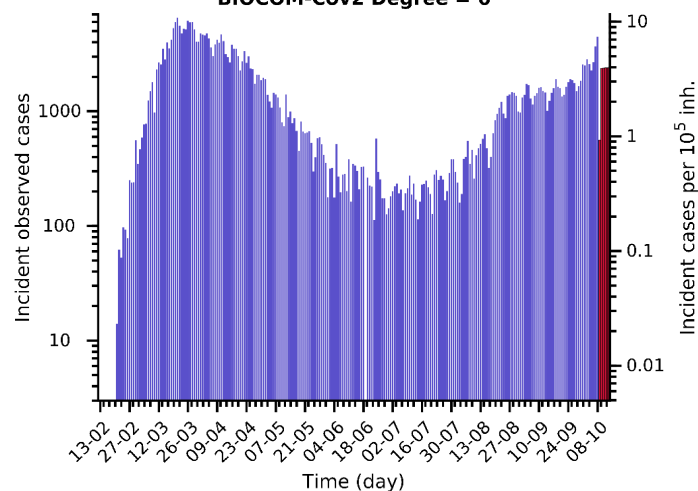
Day	Number of cases	95% Confidence Interval
09-10-2020	338960 (+562)	[338398 - 360491]
11-10-2020	343711 (+2379)	[338398 - 366116]
13-10-2020	348492 (+2394)	[338398 - 372790]

Current indicators

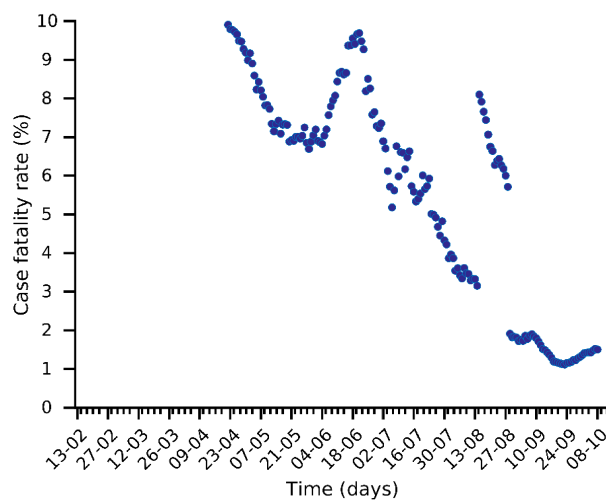
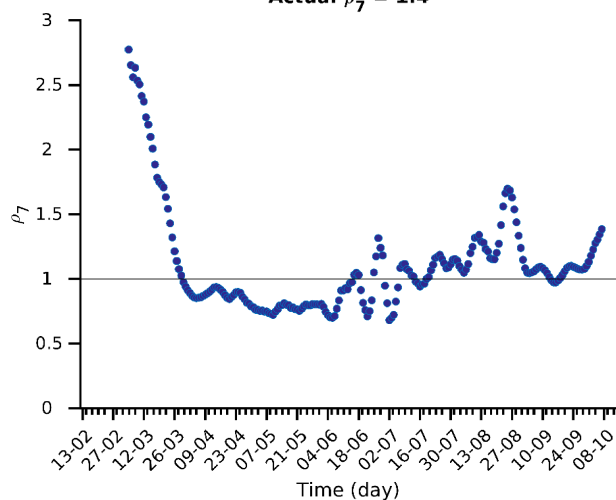
A ₁₄	EPG	CFR
56	78	1.50 %



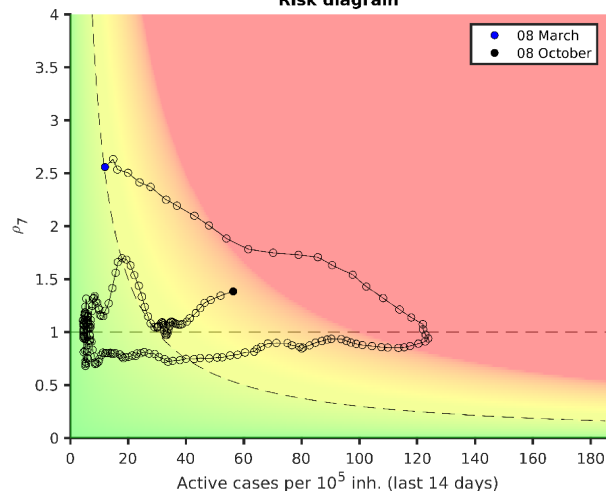
BIOCOM-Cov2 Degree = 6



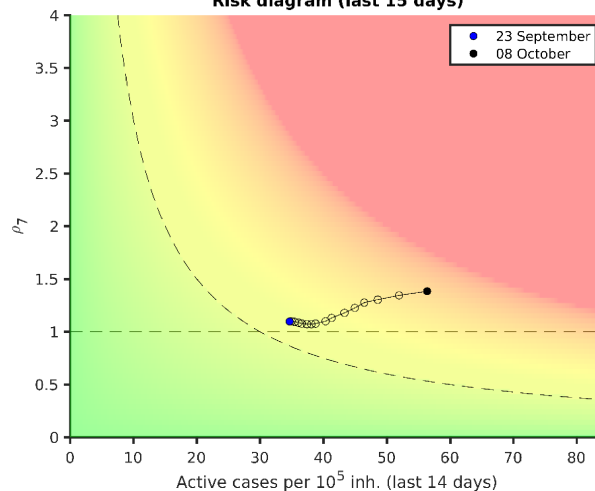
Actual $\rho_7 = 1.4$



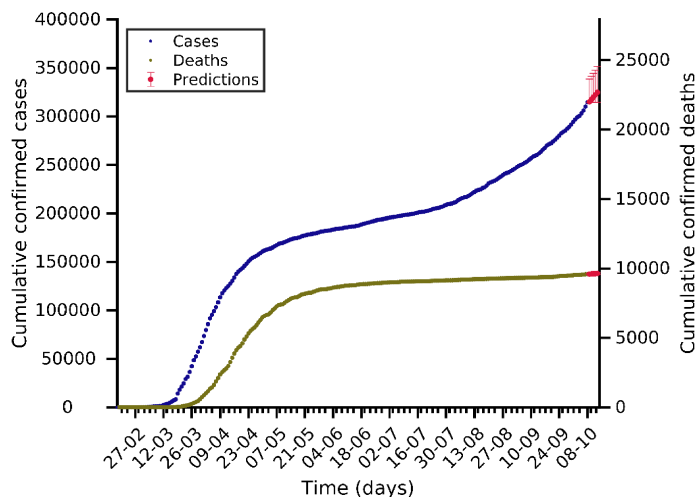
Risk diagram



Risk diagram (last 15 days)



Germany 08-10-2020. Pop: 83.8M. Cumulative incidence: 376/10⁵

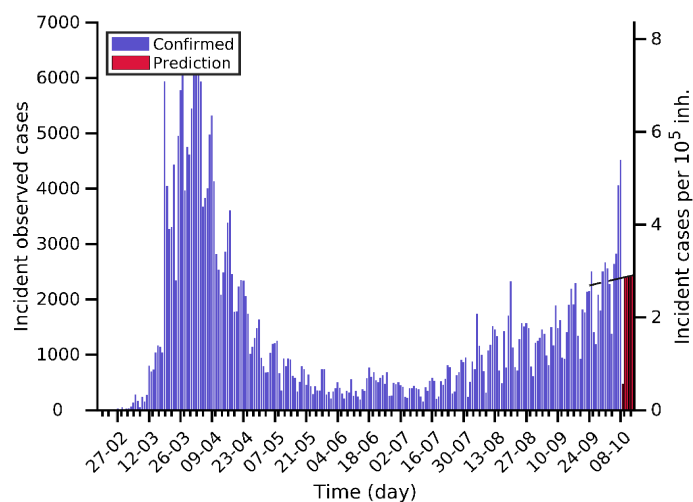


Predictions for next days

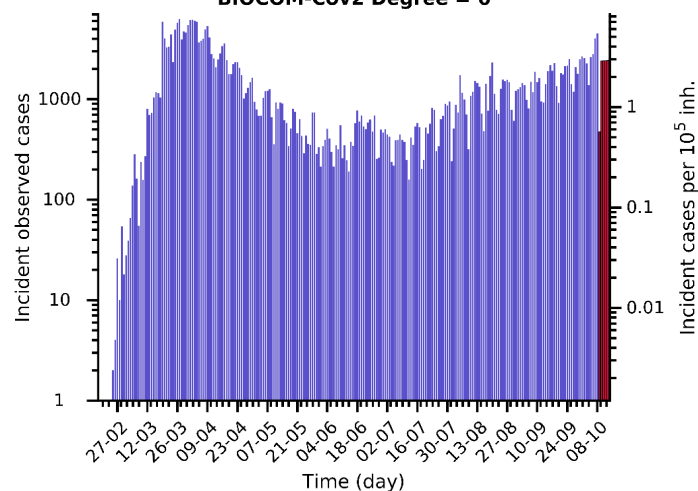
Day	Number of cases	95% Confidence Interval
09-10-2020	315135 (+475)	[314660 - 338603]
11-10-2020	319950 (+2412)	[314660 - 344379]
13-10-2020	324803 (+2431)	[314660 - 351316]

Current indicators

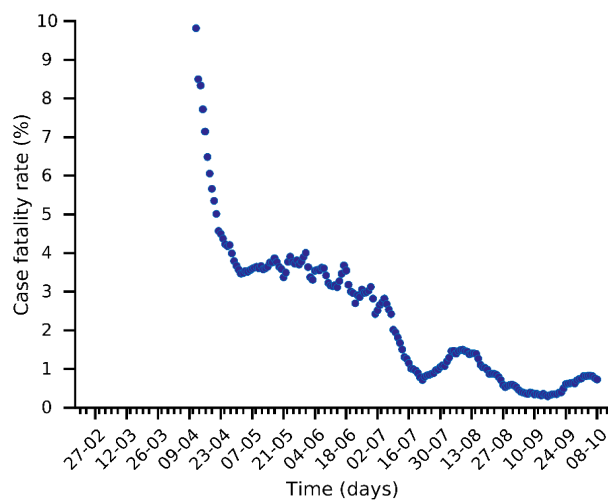
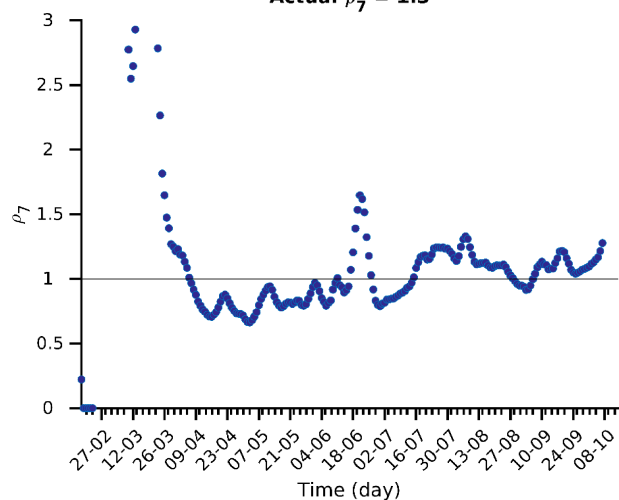
A ₁₄	EPG	CFR
41	52	0.72 %



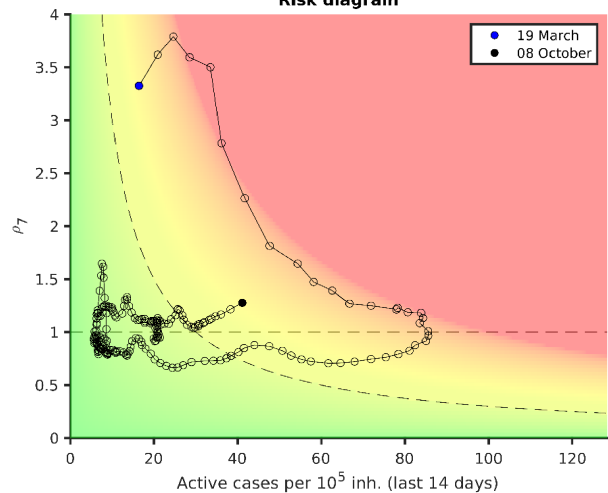
BIOCOM-Cov2 Degree = 6



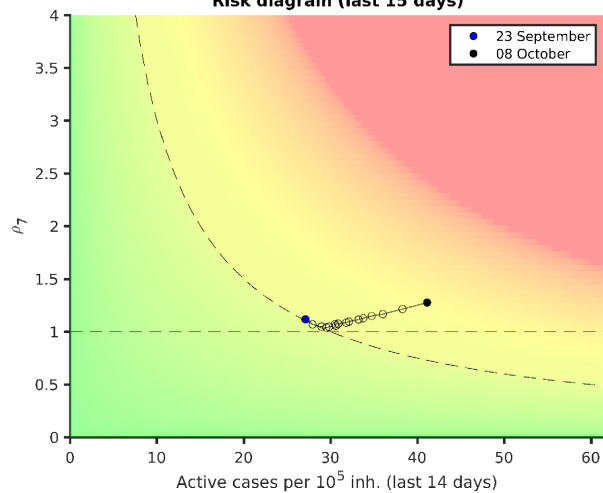
Actual $\rho_7 = 1.3$



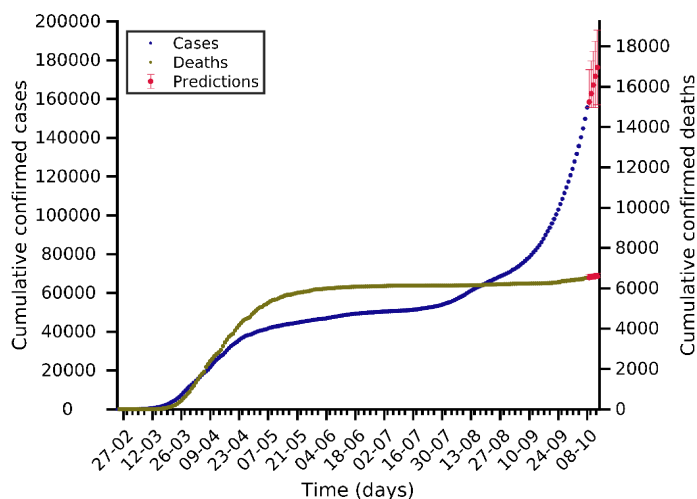
Risk diagram



Risk diagram (last 15 days)



Netherlands 08-10-2020. Pop: 17.1M. Cumulative incidence: 908/10⁵

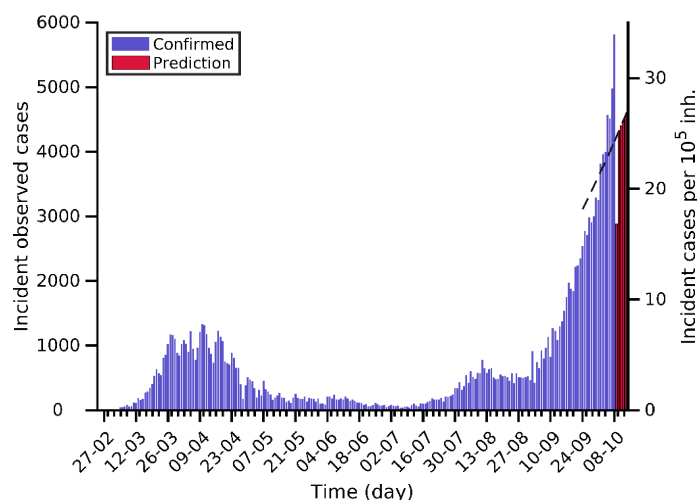


Predictions for next days

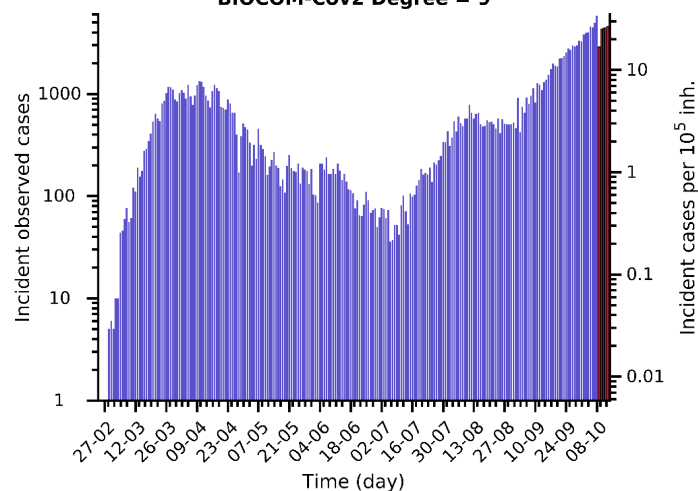
Day	Number of cases	95% Confidence Interval
09-10-2020	158514 (+2884)	[155630 - 175075]
11-10-2020	167235 (+4401)	[155630 - 184609]
13-10-2020	176283 (+4565)	[157016 - 195551]

Current indicators

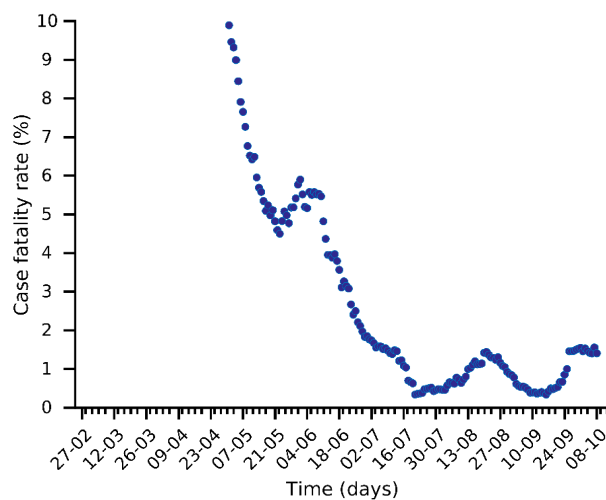
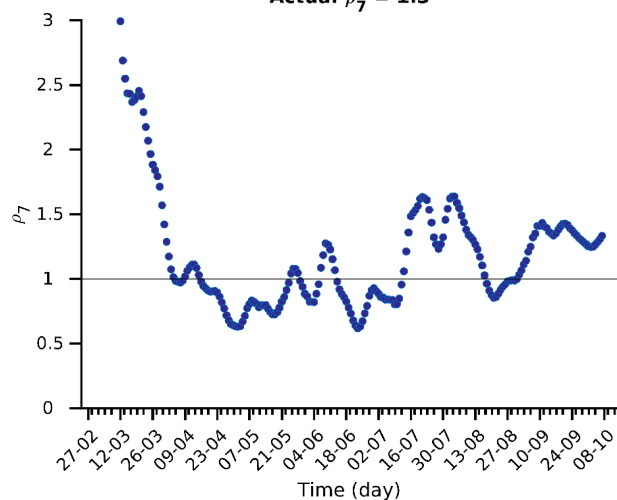
A ₁₄	EPG	CFR
307	409	1.40 %



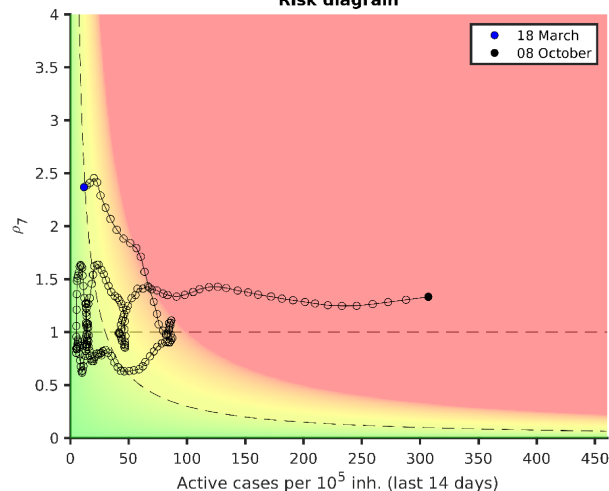
BIOCOM-Cov2 Degree = 9



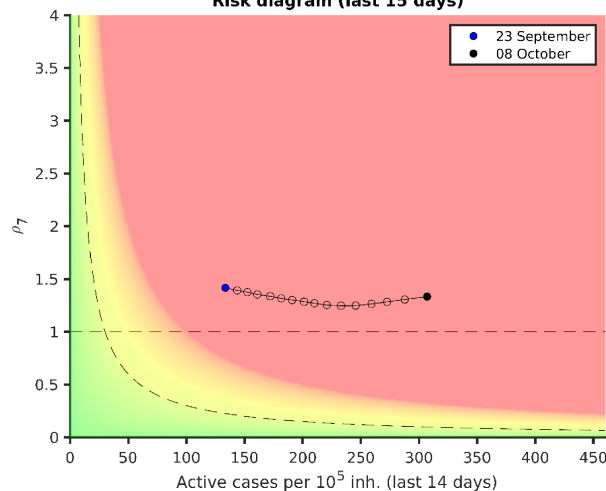
Actual $\rho_7 = 1.3$



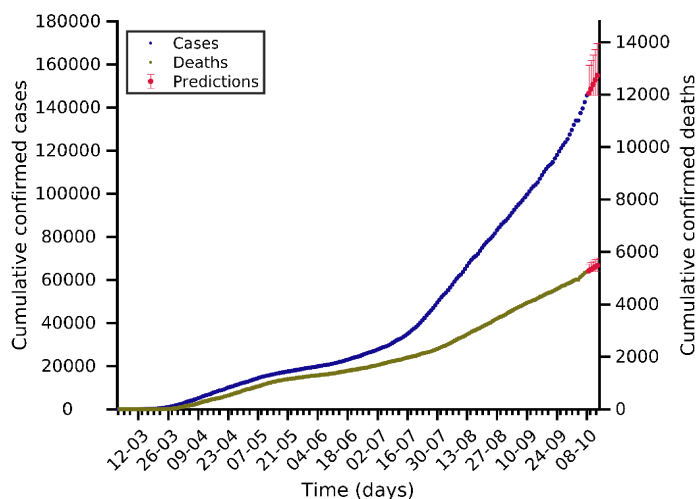
Risk diagram



Risk diagram (last 15 days)



Romania 08-10-2020. Pop: 19.2M. Cumulative incidence: 757/10⁵

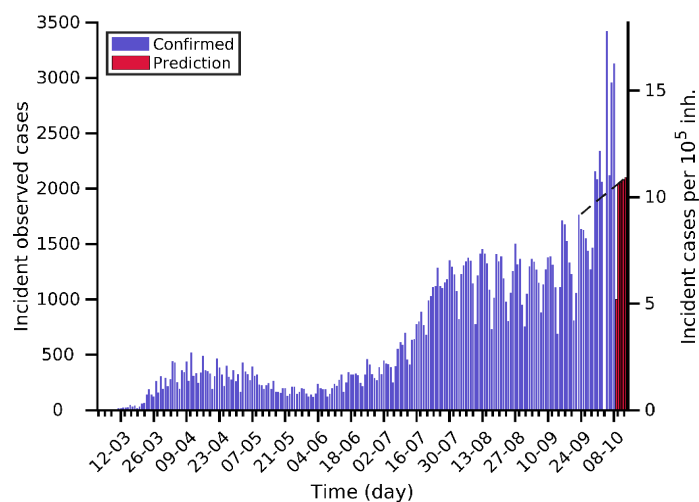


Predictions for next days

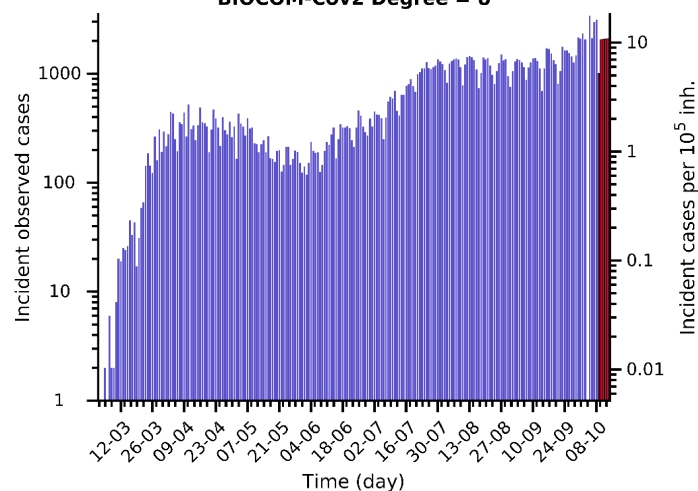
Day	Number of cases	95% Confidence Interval
09-10-2020	146701 (+1001)	[145700 - 159689]
11-10-2020	150814 (+2065)	[145700 - 164365]
13-10-2020	154997 (+2100)	[145700 - 169799]

Current indicators

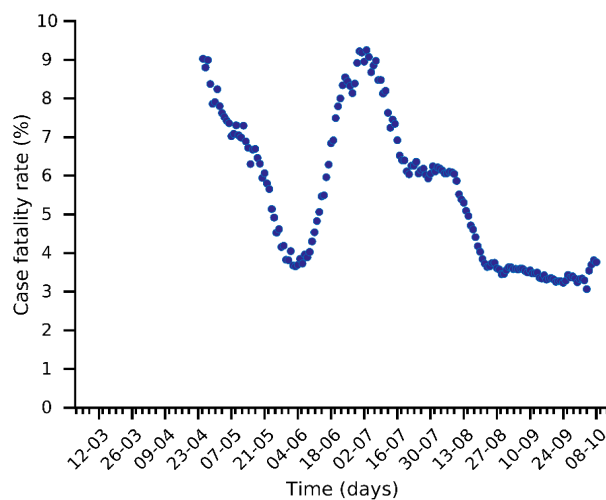
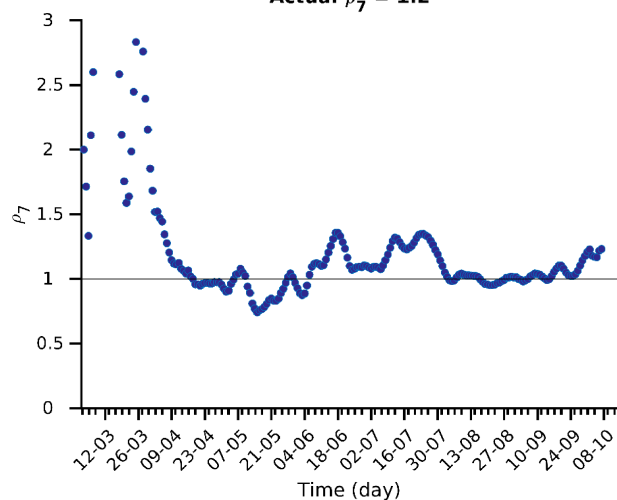
A ₁₄	EPG	CFR
144	177	3.76 %



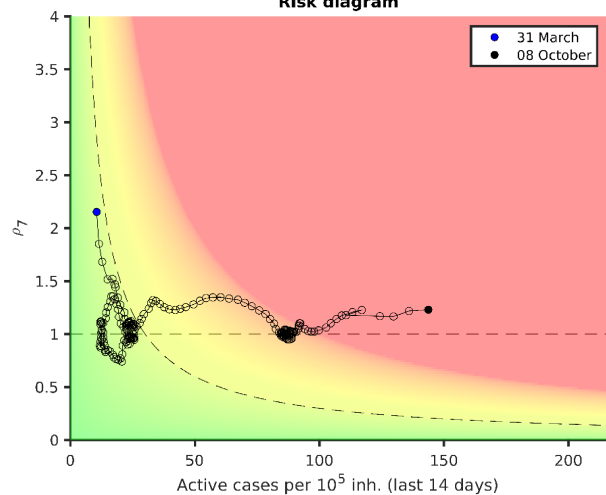
BIOCOM-Cov2 Degree = 8



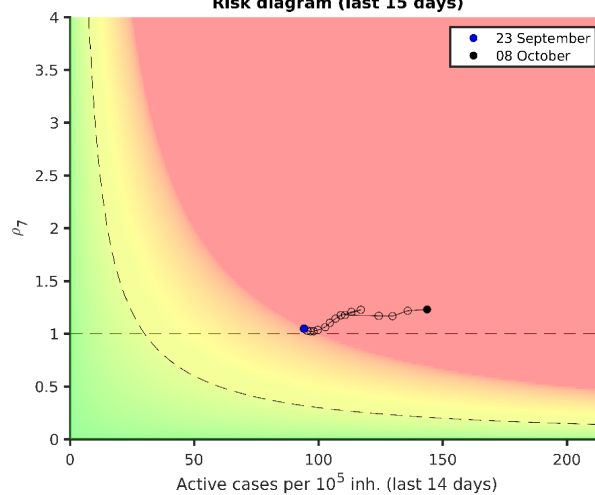
Actual $\rho_7 = 1.2$



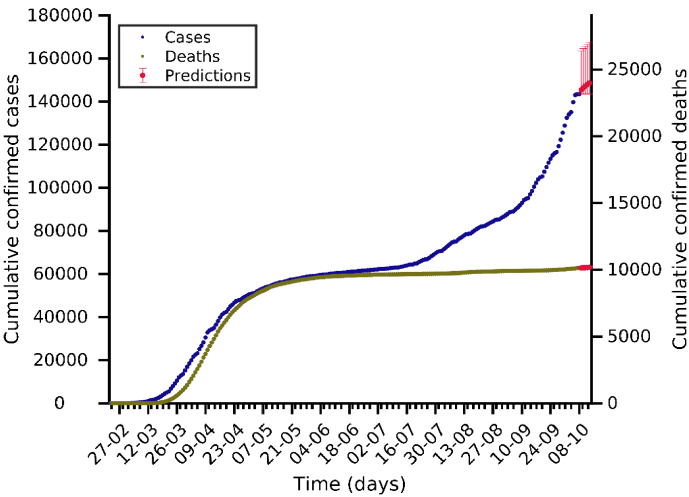
Risk diagram



Risk diagram (last 15 days)

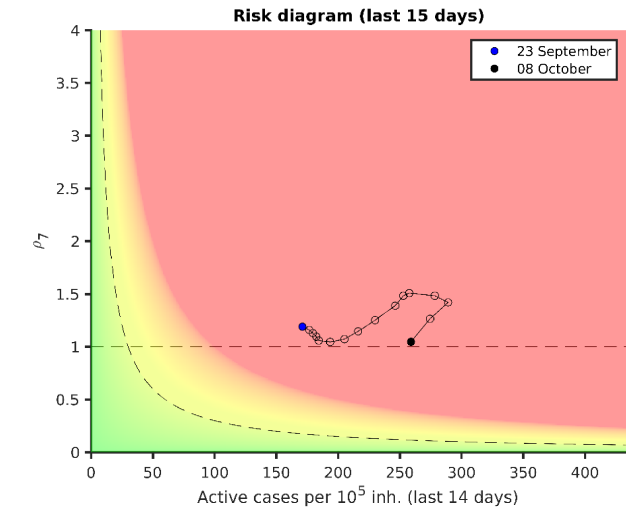
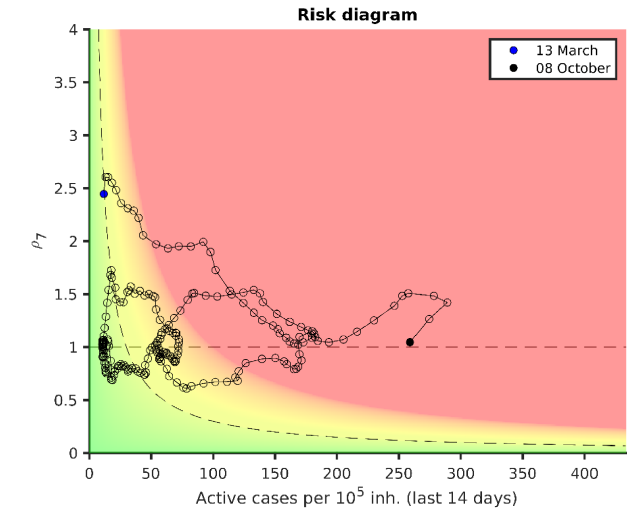
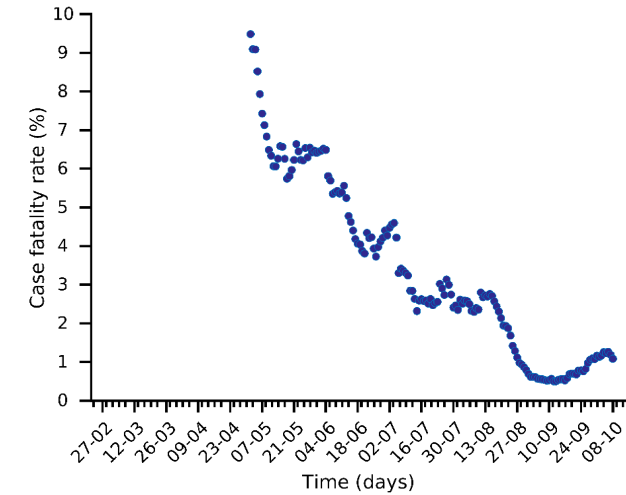
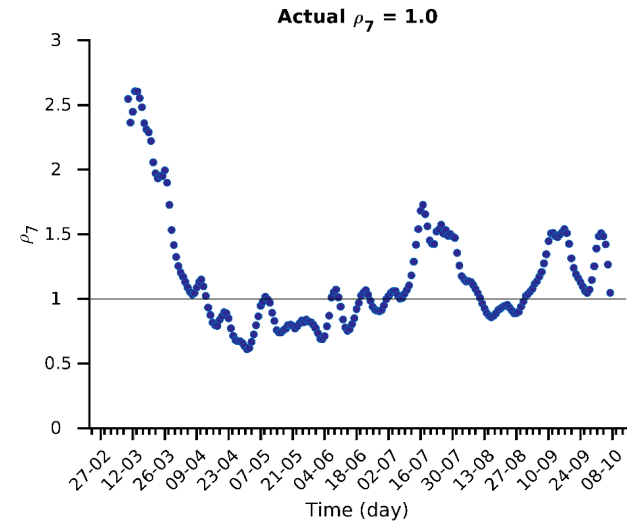
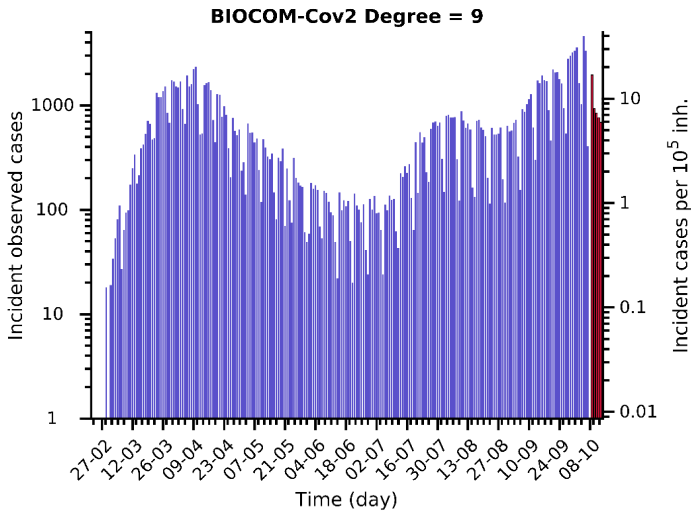
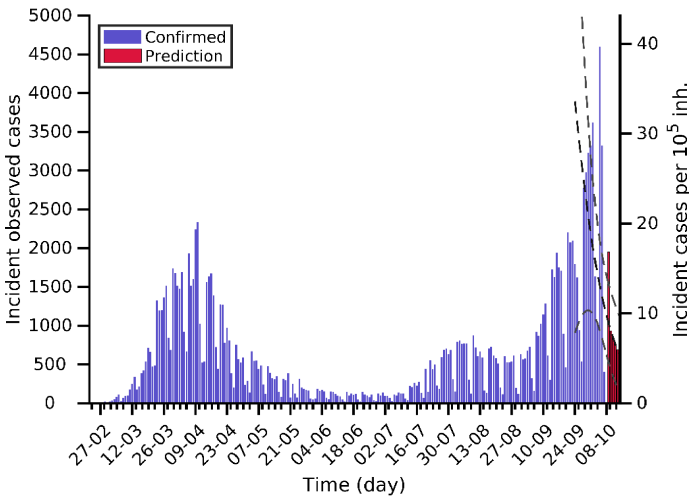


Belgium 08-10-2020. Pop: 11.6M. Cumulative incidence: 1238/10⁵

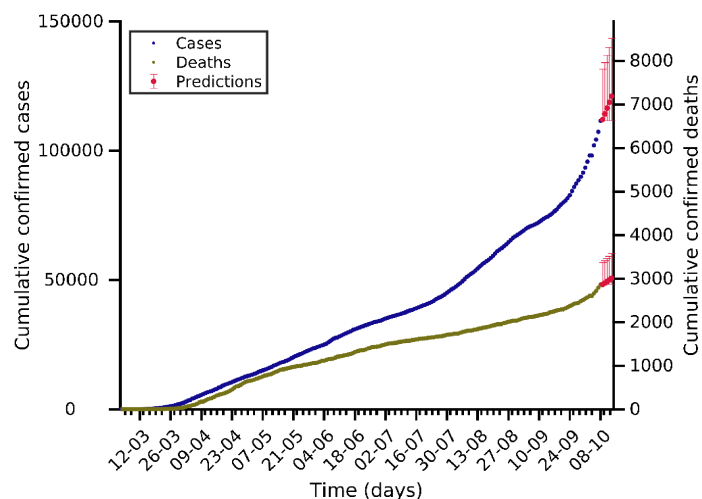


Predictions for next days		
Day	Number of cases	95% Confidence Interval
09-10-2020	145456 (+1953)	[143503 - 163555]
11-10-2020	147227 (+842)	[143503 - 165653]
13-10-2020	148676 (+687)	[143503 - 167613]

Current indicators		
A ₁₄	EPG	CFR
259	271	1.08 %



Poland 08-10-2020. Pop: 37.8M. Cumulative incidence: 295/10⁵

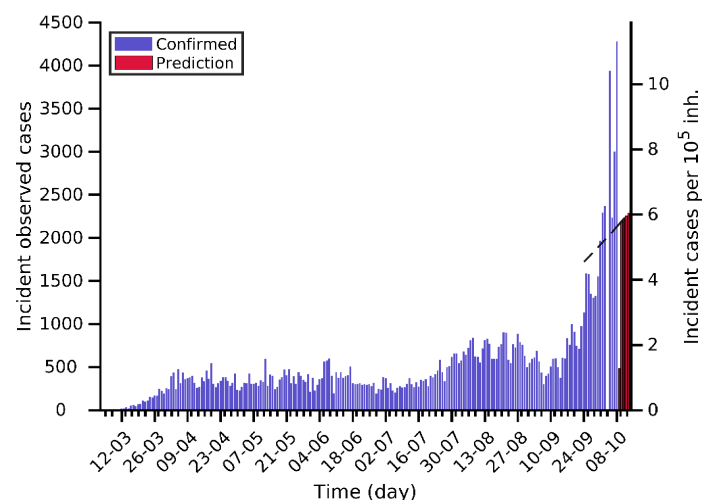


Predictions for next days

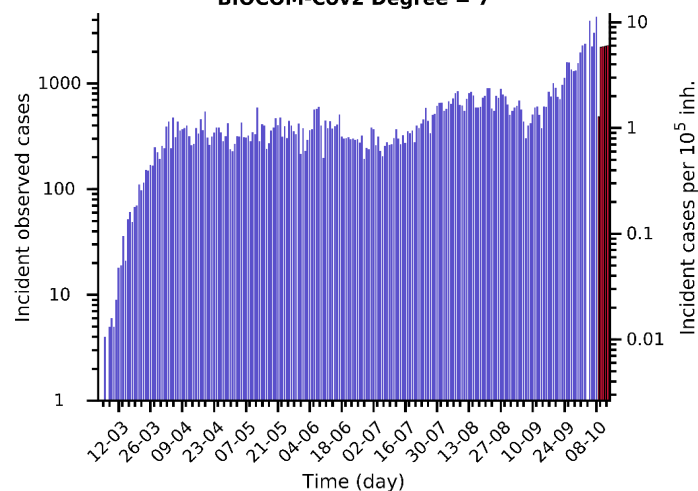
Day	Number of cases	95% Confidence Interval
09-10-2020	112085 (+486)	[111599 - 131529]
11-10-2020	116501 (+2224)	[111599 - 136843]
13-10-2020	121043 (+2287)	[111599 - 143431]

Current indicators

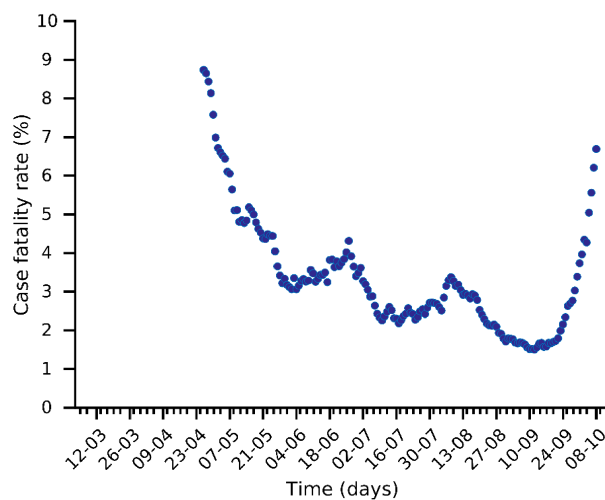
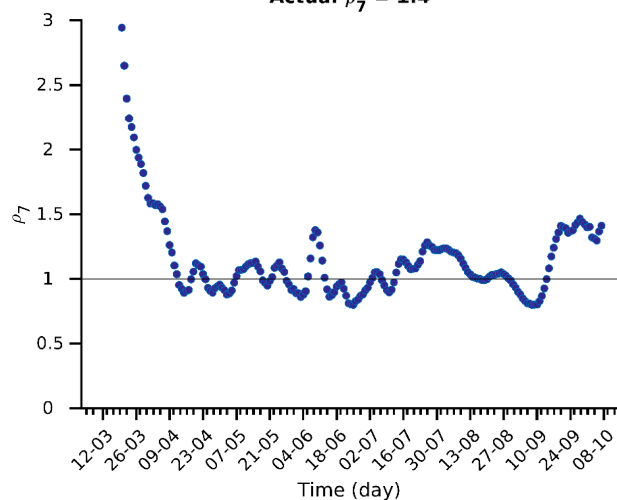
A ₁₄	EPG	CFR
76	107	6.69 %



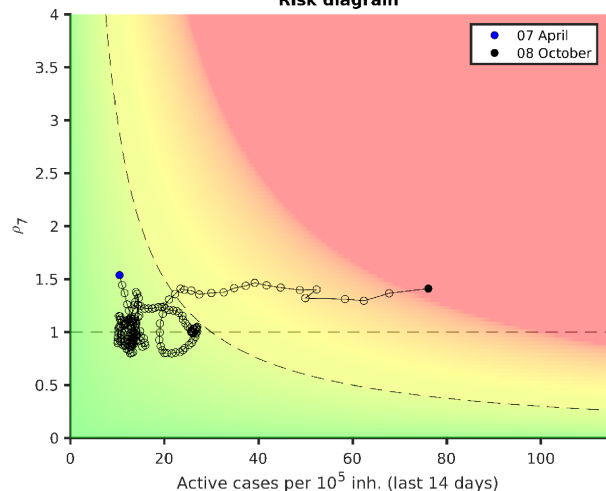
BIOCOM-Cov2 Degree = 7



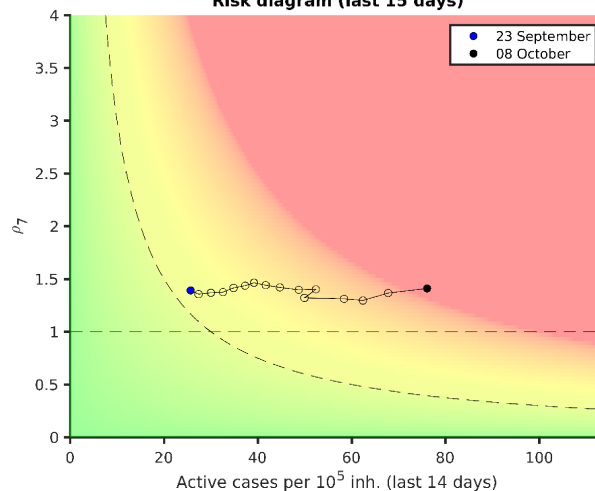
Actual $\rho_7 = 1.4$



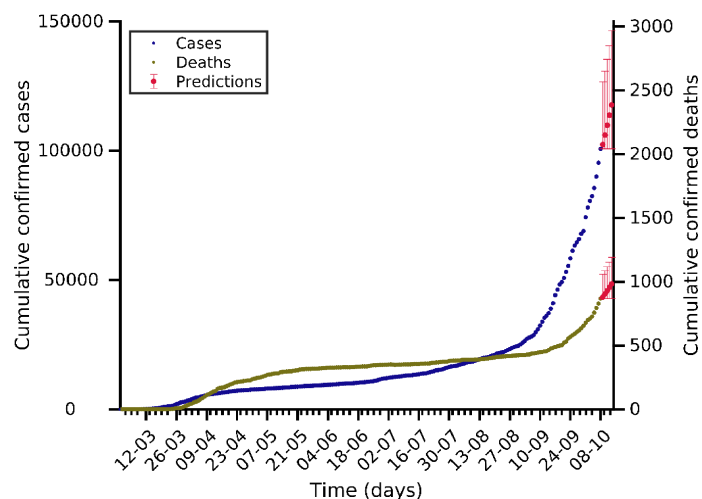
Risk diagram



Risk diagram (last 15 days)



Czech Rep 08-10-2020. Pop: 10.7M. Cumulative incidence: 941/10⁵

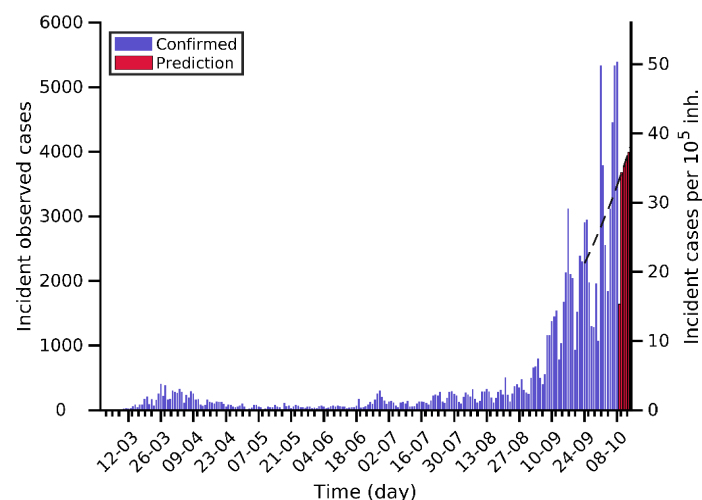


Predictions for next days

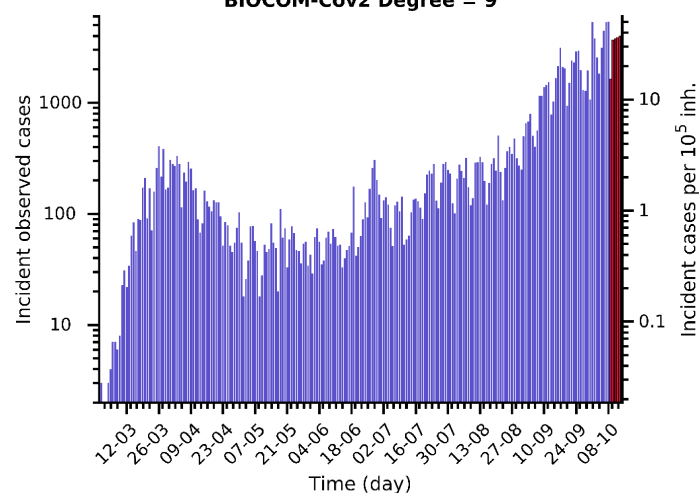
Day	Number of cases	95% Confidence Interval
09-10-2020	102396 (+1639)	[100757 - 126636]
11-10-2020	109856 (+3781)	[100757 - 135403]
13-10-2020	117737 (+3994)	[100757 - 146444]

Current indicators

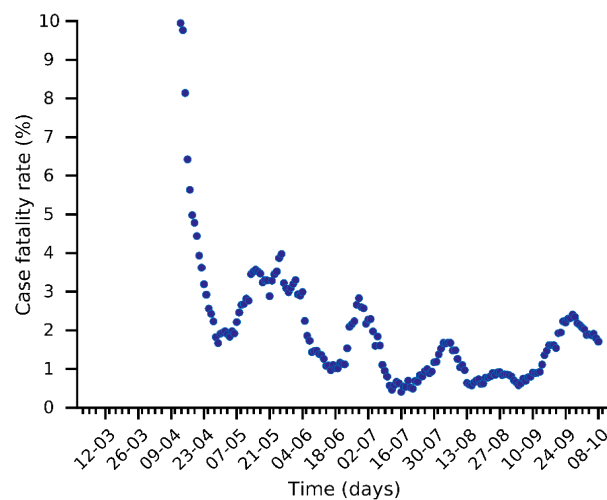
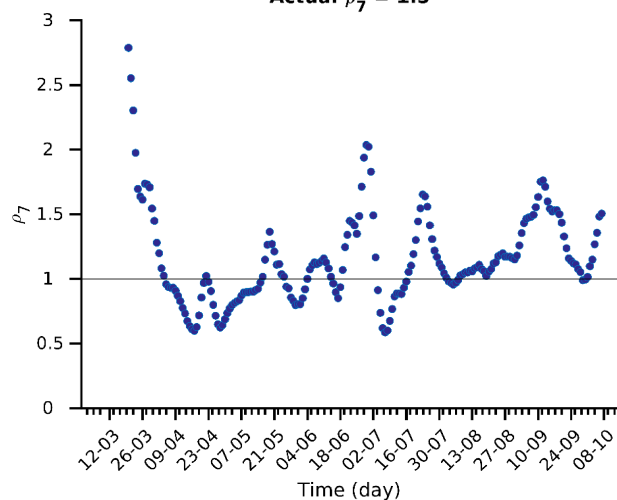
A ₁₄	EPG	CFR
396	596	1.71 %



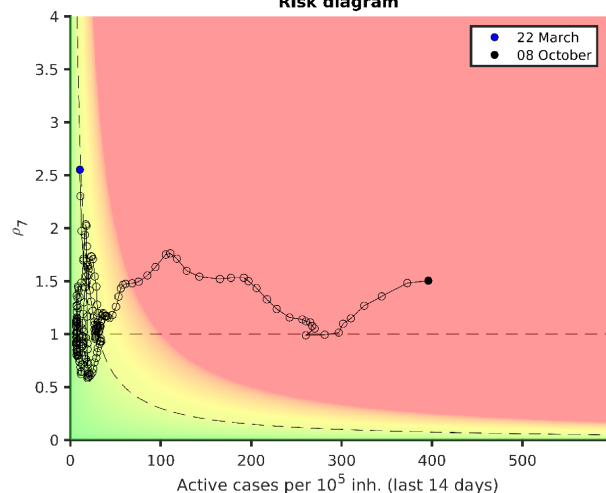
BIOCOM-Cov2 Degree = 9



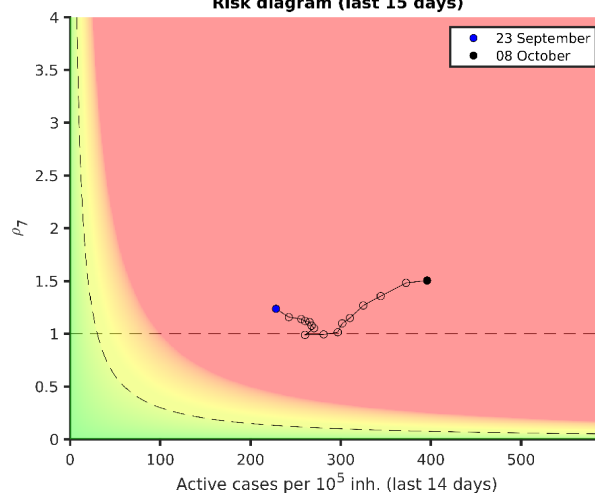
Actual $\rho_7 = 1.5$



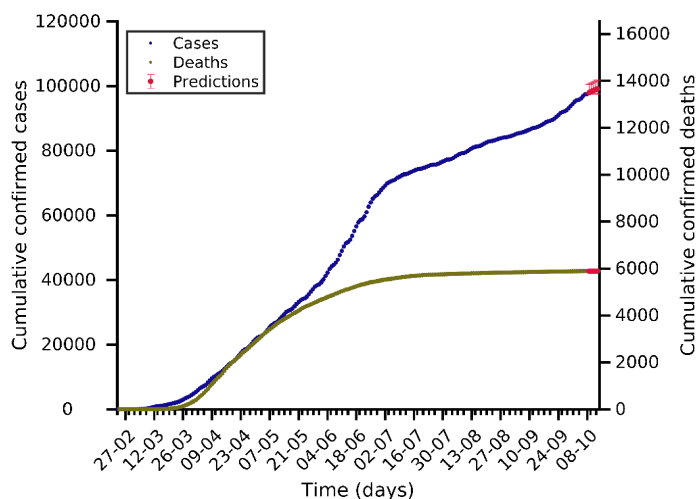
Risk diagram



Risk diagram (last 15 days)



Sweden 08-10-2020. Pop: 10.1M. Cumulative incidence: 966/10⁵

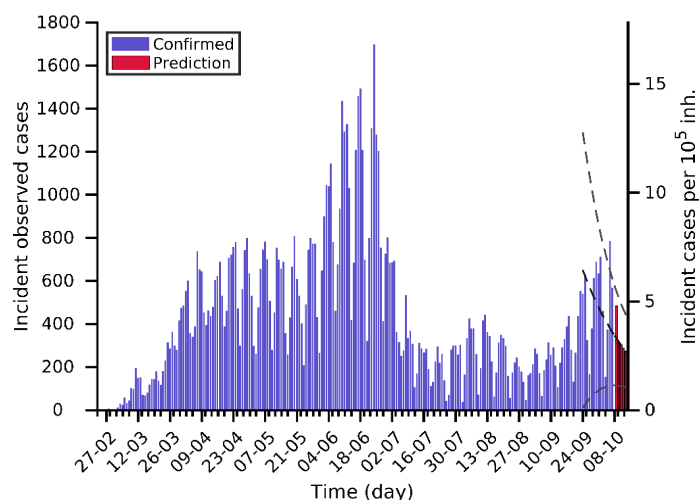


Predictions for next days

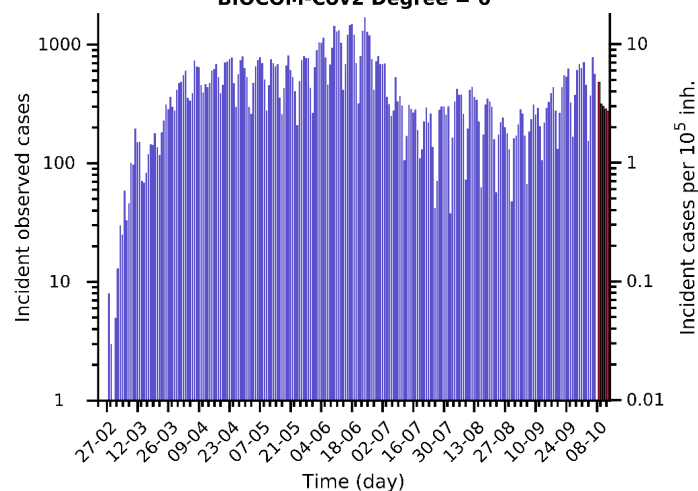
Day	Number of cases	95% Confidence Interval
09-10-2020	98017 (+485)	[97532 - 100514]
11-10-2020	98635 (+302)	[97532 - 101200]
13-10-2020	99198 (+275)	[97532 - 101888]

Current indicators

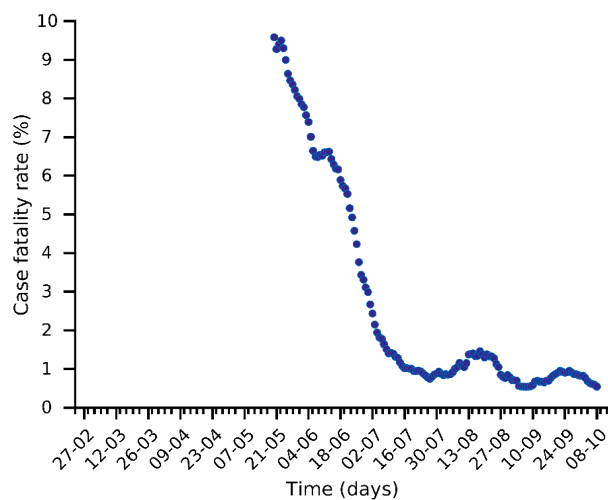
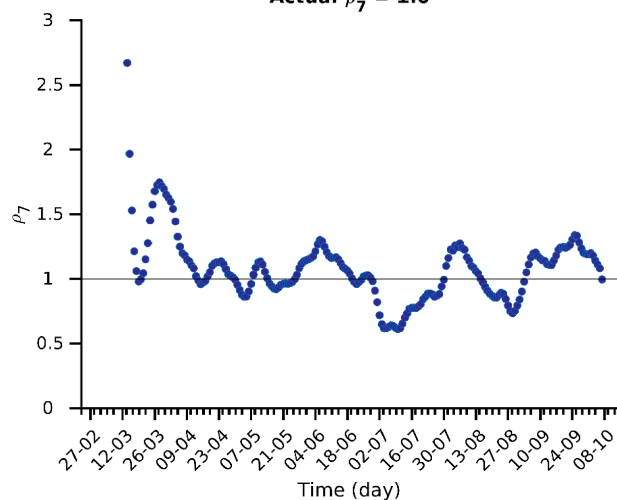
A ₁₄	EPG	CFR
64	64	0.54 %



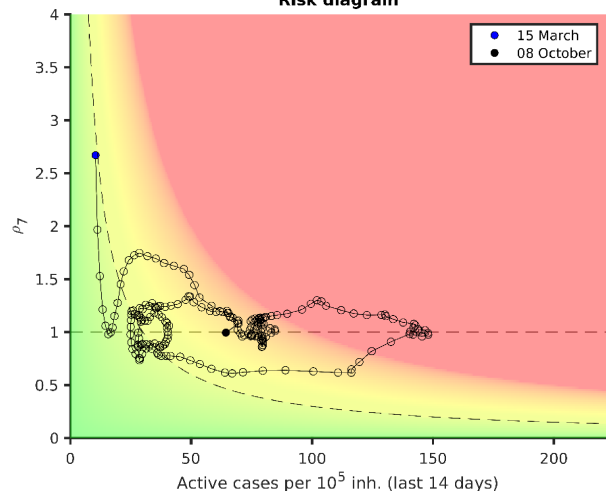
BIOCOM-Cov2 Degree = 6



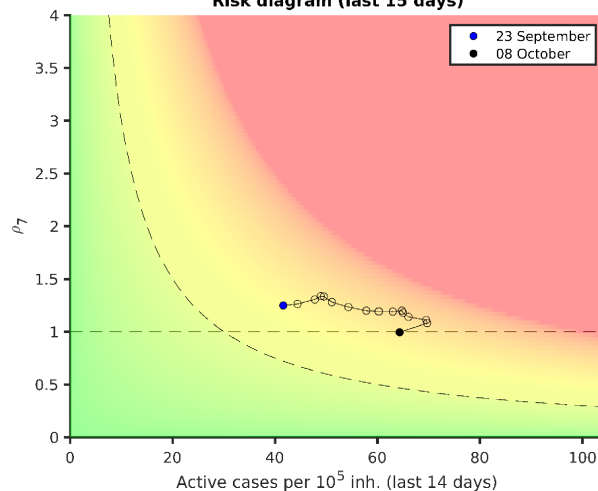
Actual $\rho_7 = 1.0$



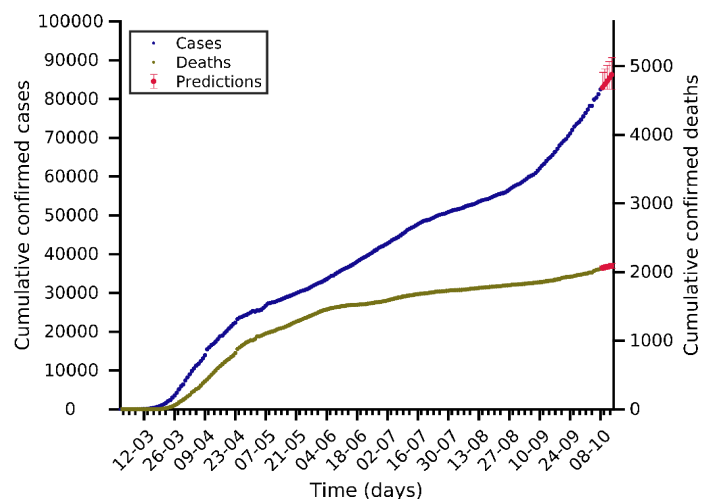
Risk diagram



Risk diagram (last 15 days)



Portugal 08-10-2020. Pop: 10.2M. Cumulative incidence: 809/10⁵

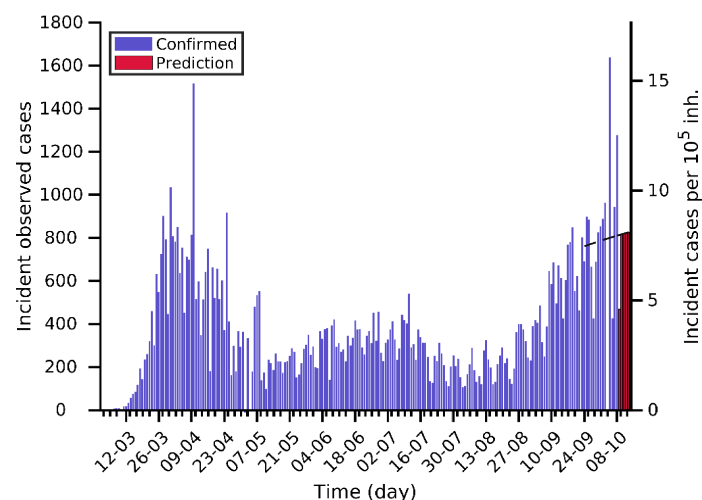


Predictions for next days

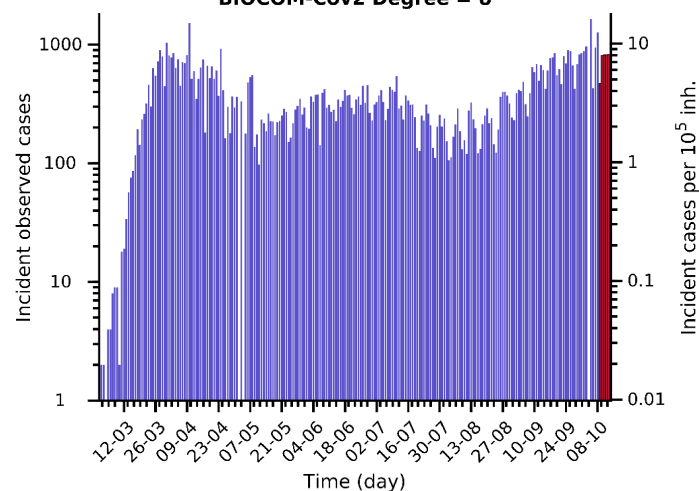
Day	Number of cases	95% Confidence Interval
09-10-2020	83004 (+470)	[82534 - 86881]
11-10-2020	84640 (+820)	[82534 - 88678]
13-10-2020	86290 (+826)	[82534 - 90676]

Current indicators

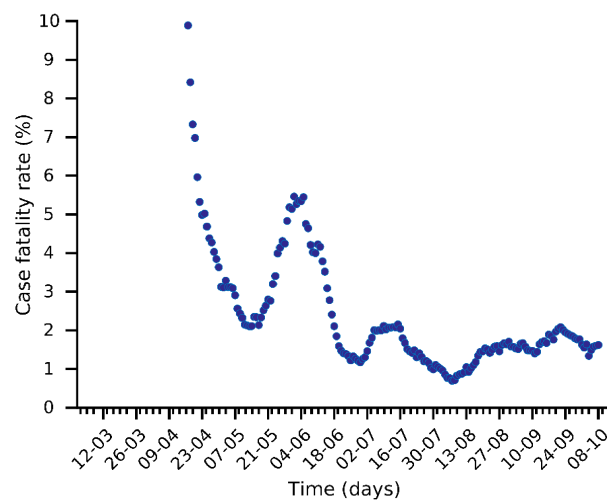
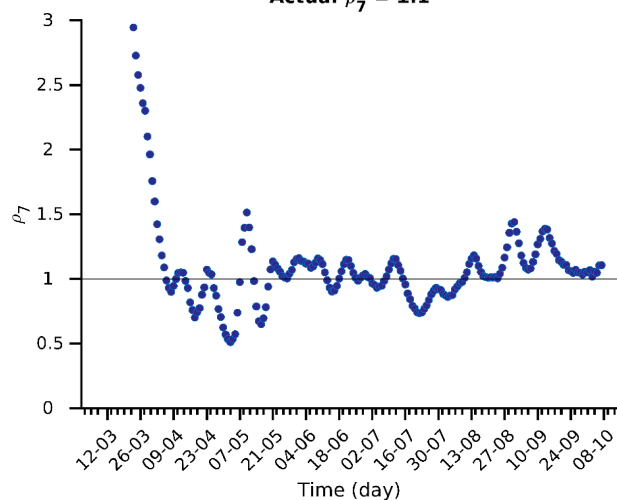
A ₁₄	EPG	CFR
112	123	1.62 %



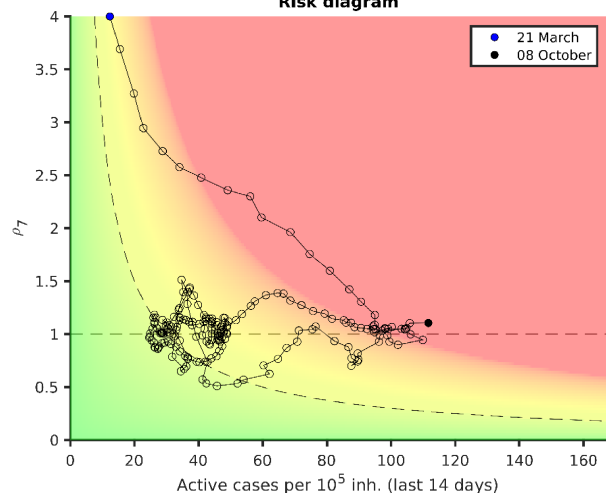
BIOCOM-Cov2 Degree = 8



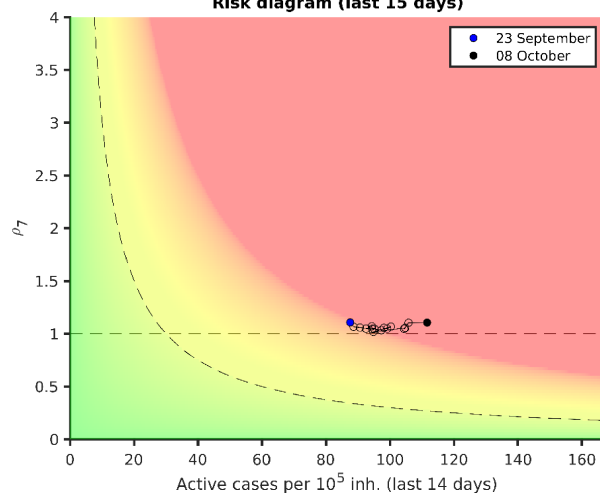
Actual $\rho_7 = 1.1$



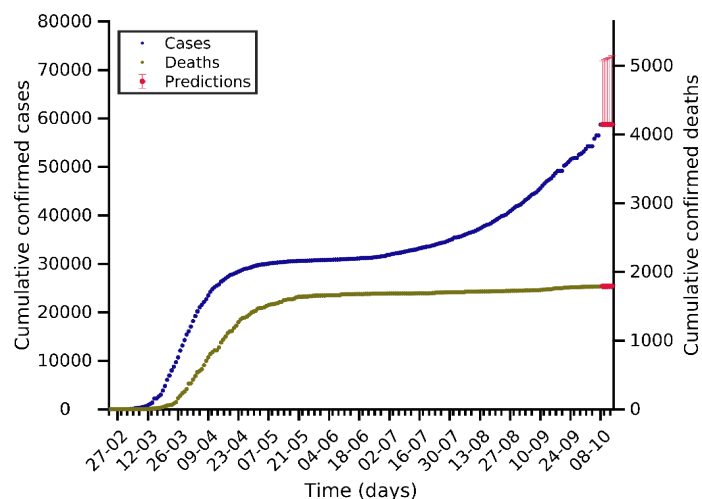
Risk diagram



Risk diagram (last 15 days)



Switzerland 08-10-2020. Pop: 8.7M. Cumulative incidence: 679/10⁵

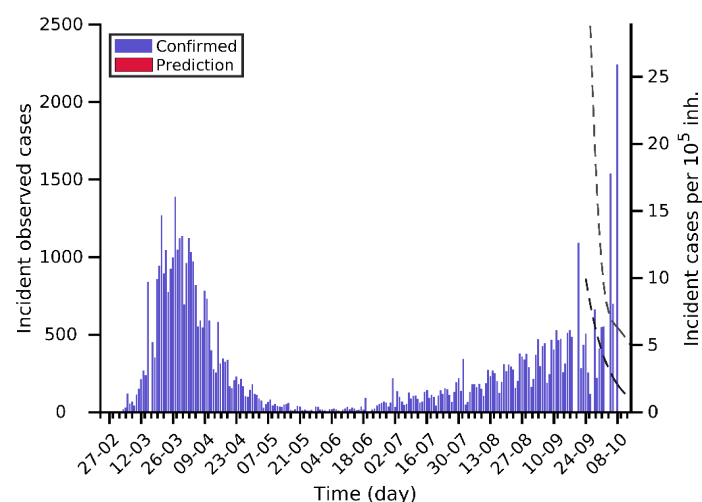


Predictions for next days

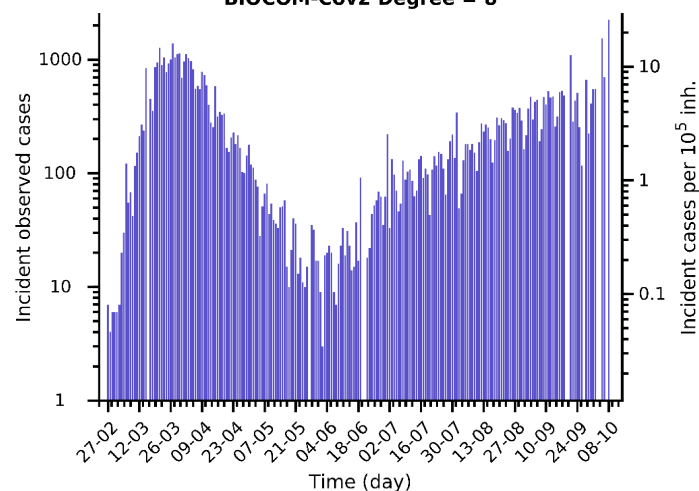
Day	Number of cases	95% Confidence Interval
09-10-2020	58745 (+0)	[58745 - 71872]
11-10-2020	58745 (+0)	[58745 - 72349]
13-10-2020	58745 (+0)	[58745 - 72868]

Current indicators

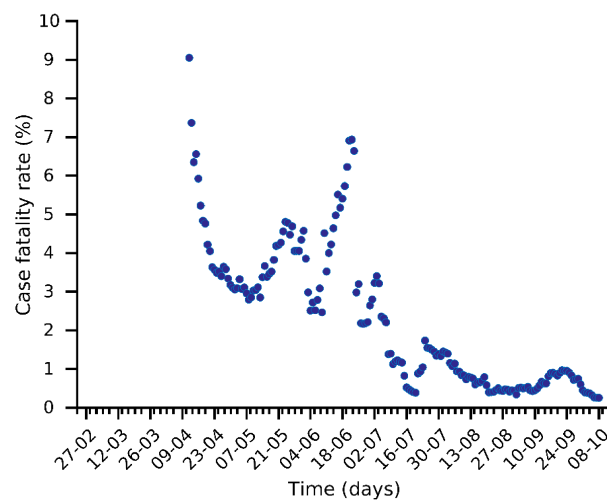
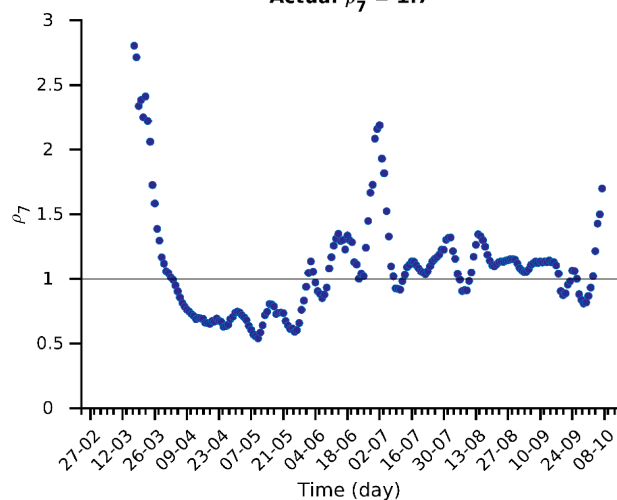
A ₁₄	EPG	CFR
84	142	0.25 %



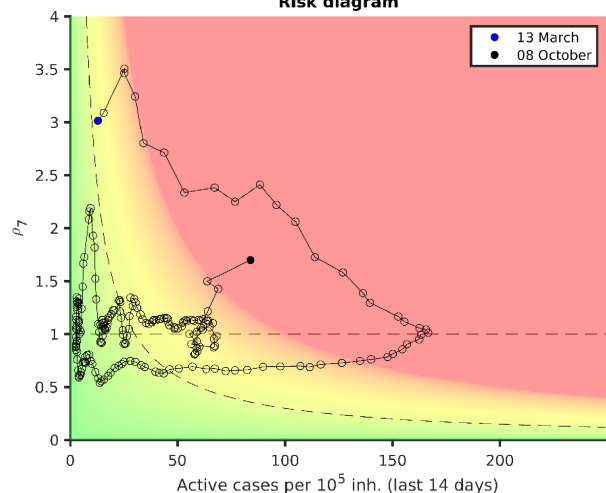
BIOCOM-Cov2 Degree = 8



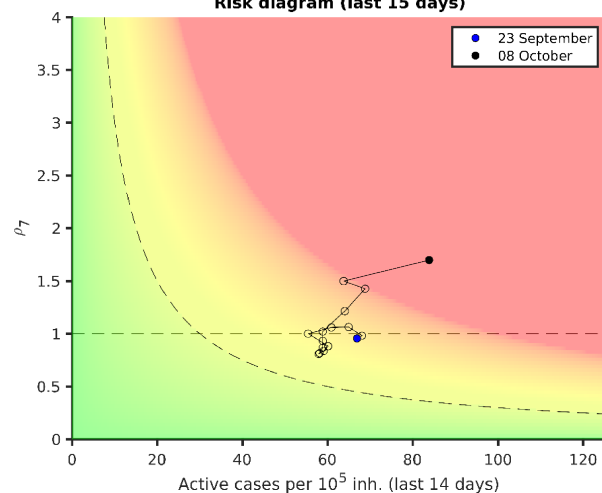
Actual $\rho_7 = 1.7$



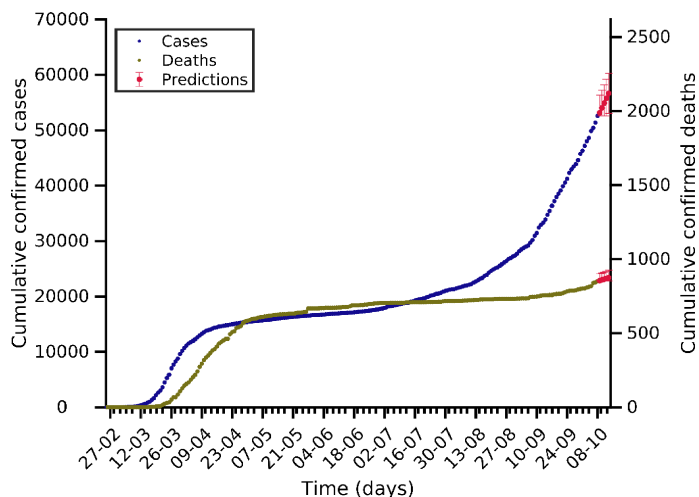
Risk diagram



Risk diagram (last 15 days)



Austria 08-10-2020. Pop: 9.0M. Cumulative incidence: 584/10⁵

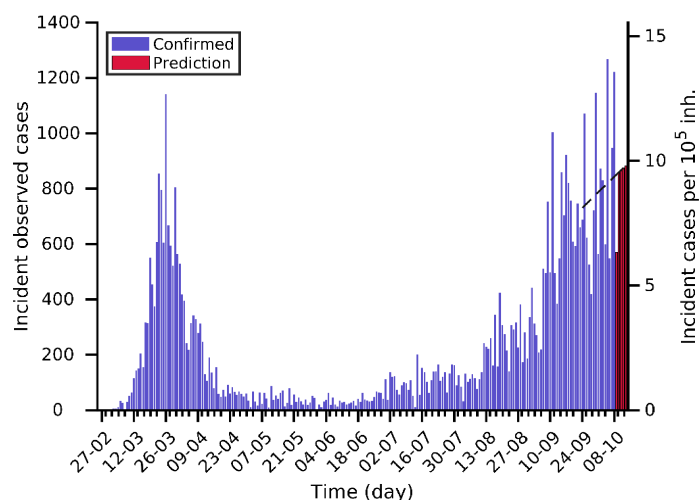


Predictions for next days

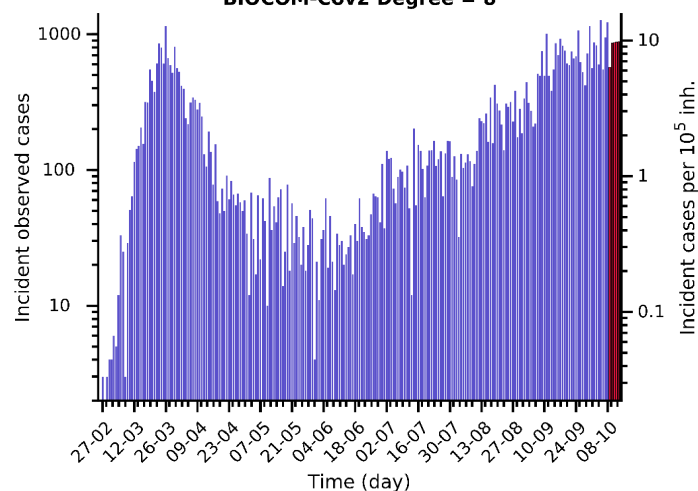
Day	Number of cases	95% Confidence Interval
09-10-2020	53174 (+571)	[52603 - 56329]
11-10-2020	54900 (+867)	[52603 - 58194]
13-10-2020	56657 (+883)	[53053 - 60261]

Current indicators

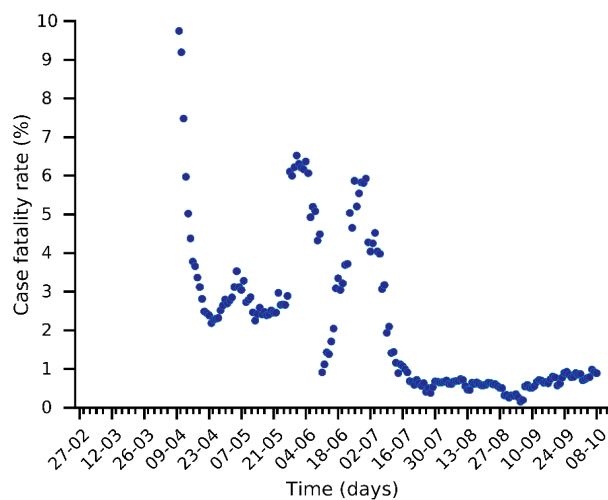
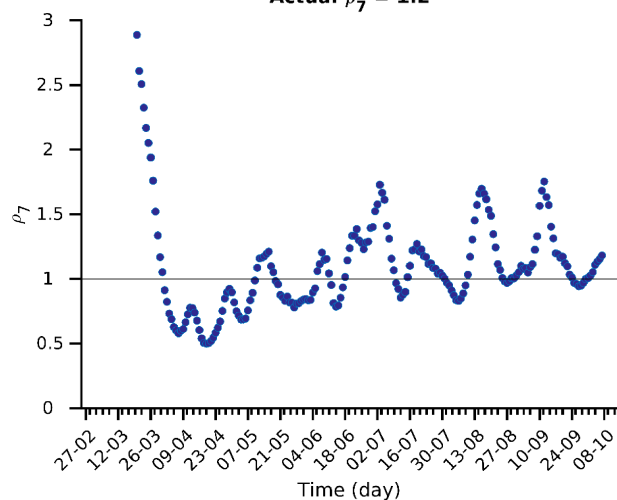
A ₁₄	EPG	CFR
126	149	0.89 %



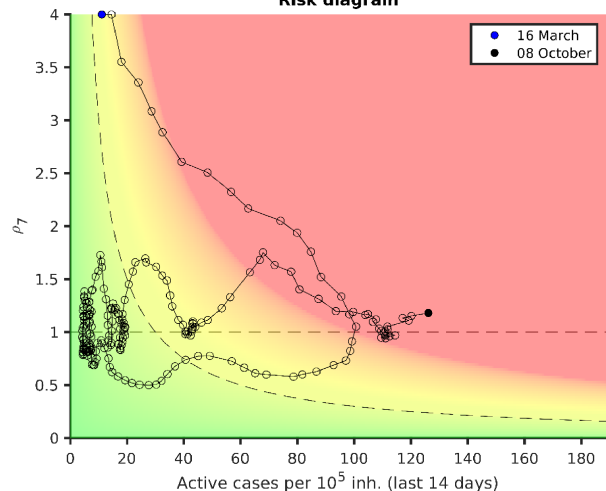
BIOCOM-Cov2 Degree = 8



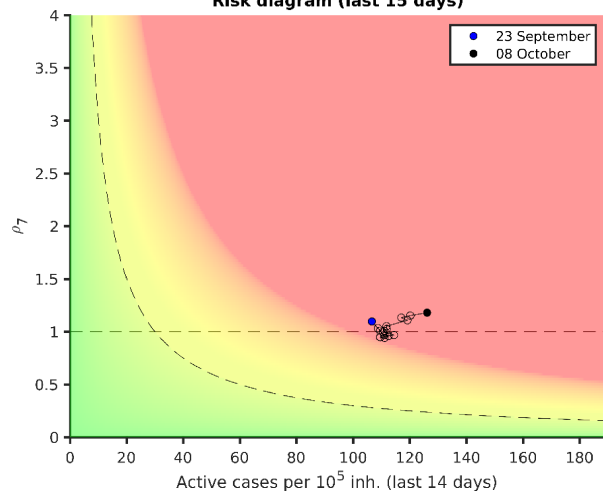
Actual $\rho_7 = 1.2$



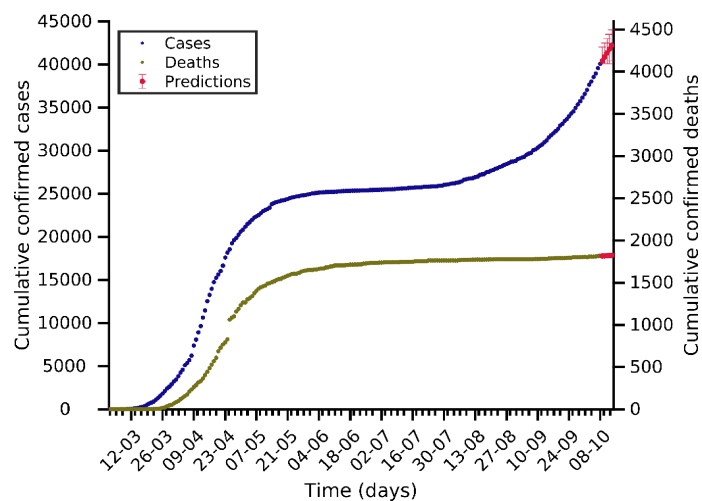
Risk diagram



Risk diagram (last 15 days)



Ireland 08-10-2020. Pop: 4.9M. Cumulative incidence: 812/10⁵

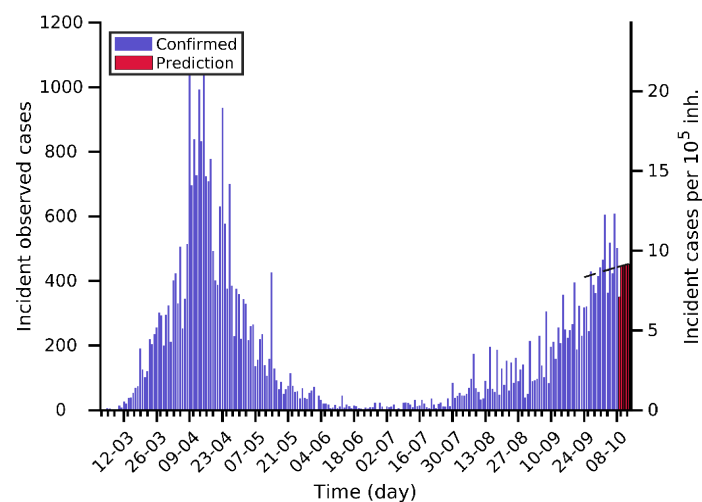


Predictions for next days

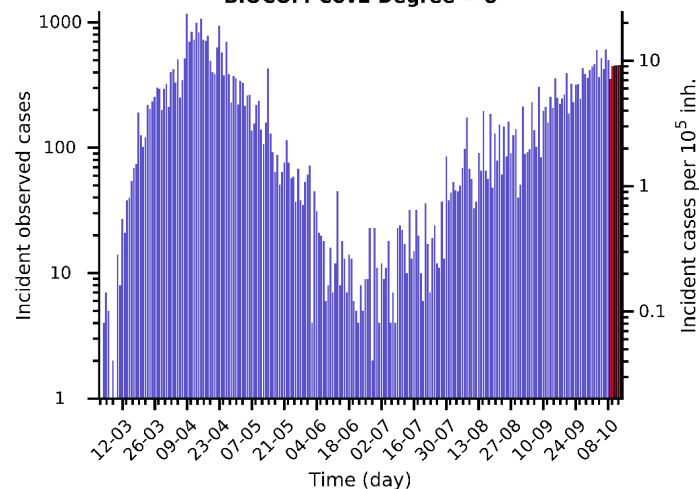
Day	Number of cases	95% Confidence Interval
09-10-2020	40437 (+351)	[40086 - 42031]
11-10-2020	41332 (+449)	[40086 - 42992]
13-10-2020	42235 (+453)	[40429 - 44040]

Current indicators

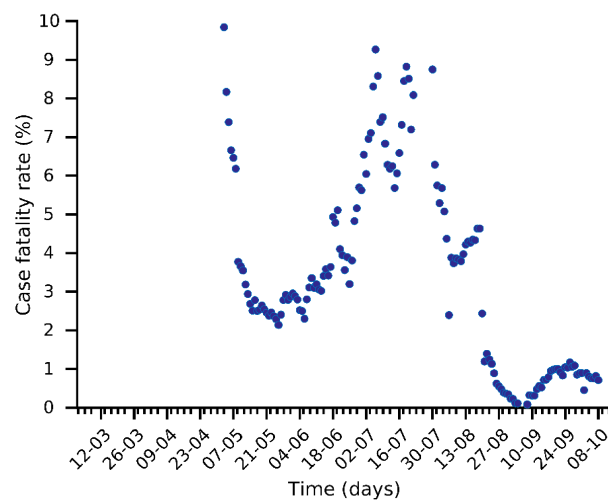
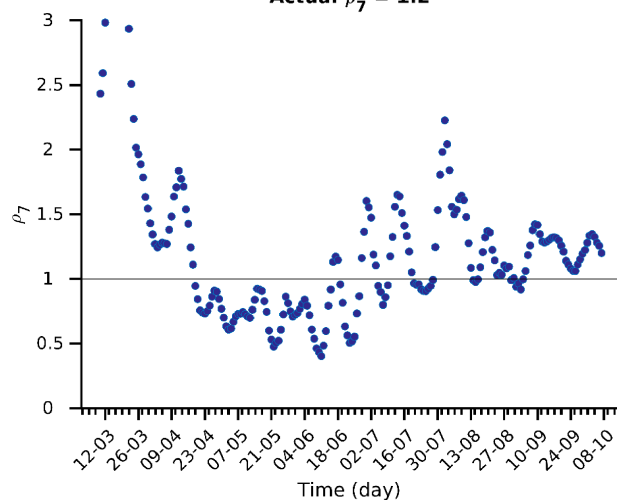
A ₁₄	EPG	CFR
123	148	0.71 %



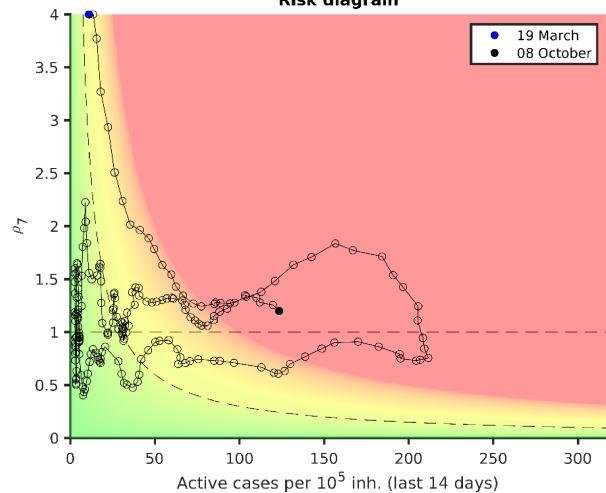
BIOCOM-Cov2 Degree = 8



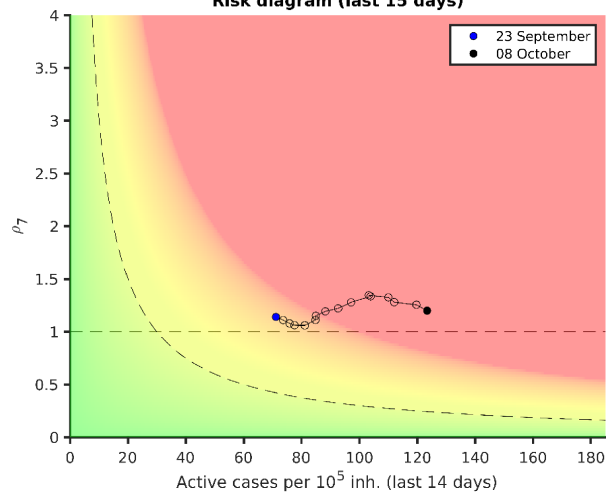
Actual $\rho_7 = 1.2$



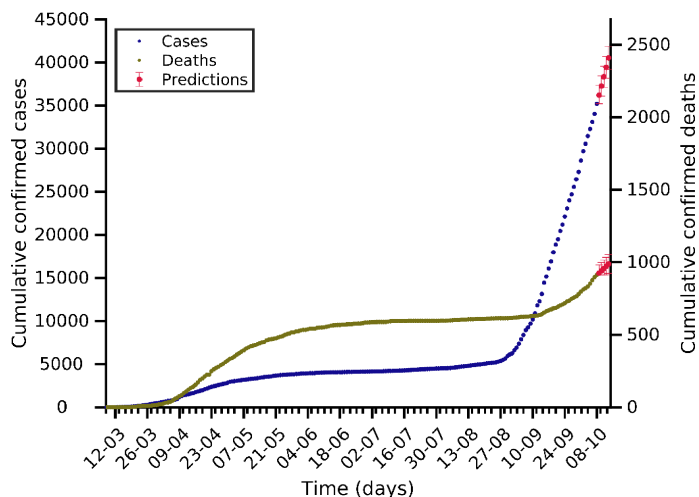
Risk diagram



Risk diagram (last 15 days)



Hungary 08-10-2020. Pop: 9.7M. Cumulative incidence: 365/10⁵

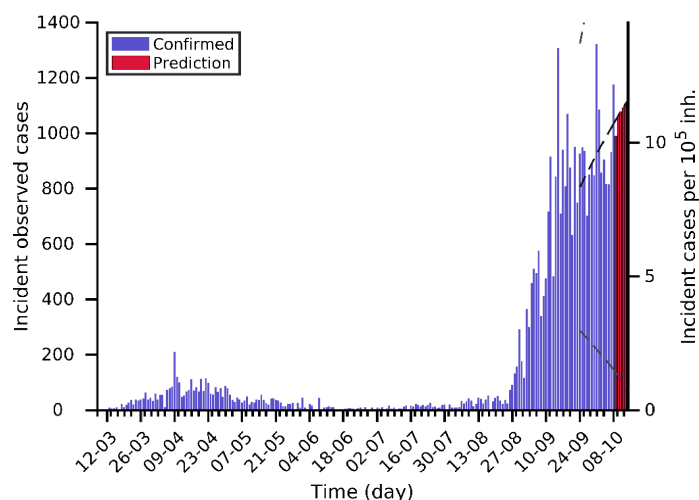


Predictions for next days

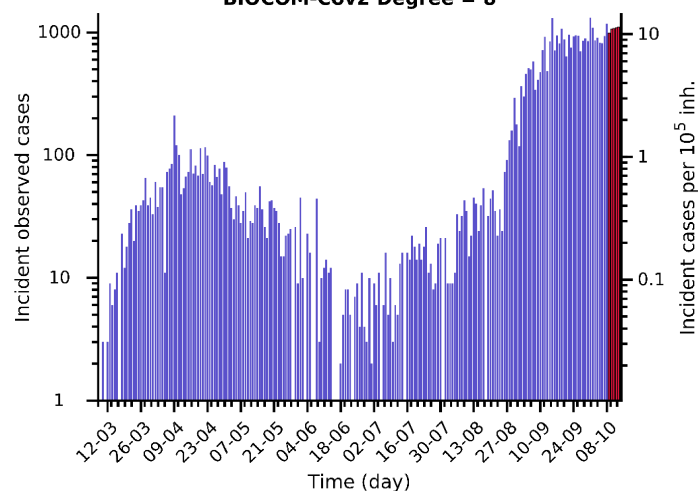
Day	Number of cases	95% Confidence Interval
09-10-2020	36212 (+990)	[35222 - 37376]
11-10-2020	38354 (+1078)	[37134 - 39574]
13-10-2020	40552 (+1106)	[39204 - 41899]

Current indicators

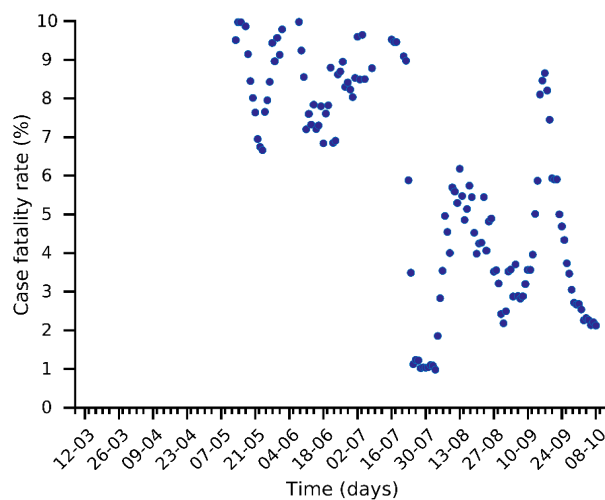
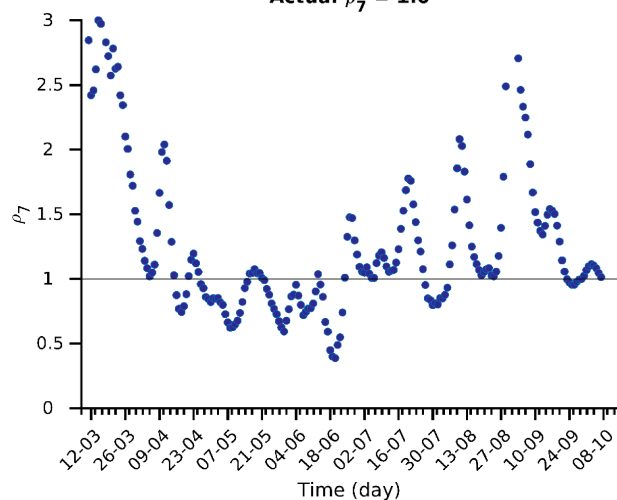
A ₁₄	EPG	CFR
136	137	2.12 %



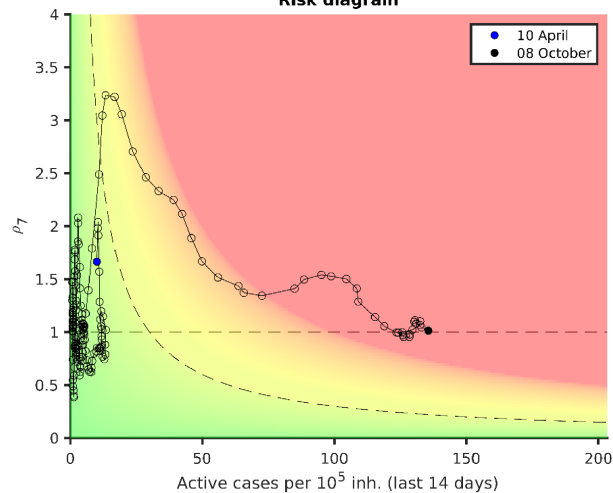
BIOCOM-Cov2 Degree = 8



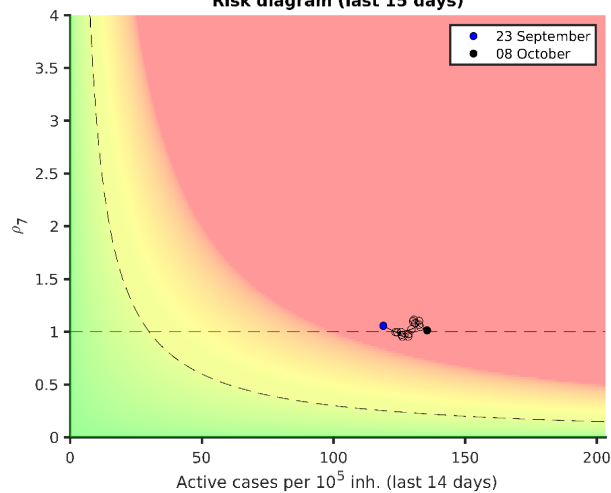
Actual $\rho_7 = 1.0$



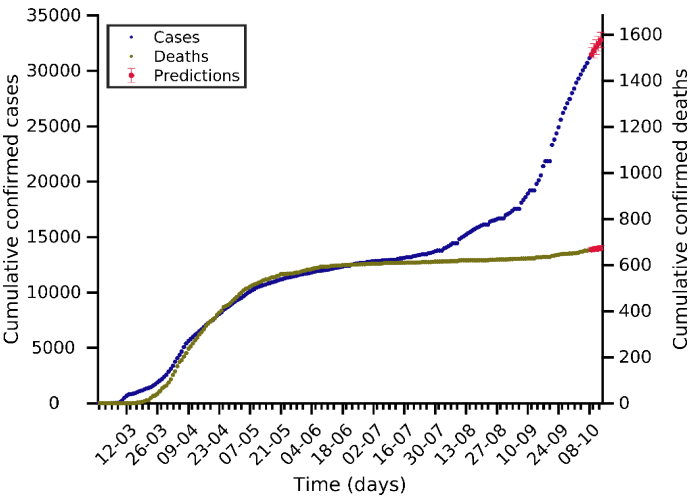
Risk diagram



Risk diagram (last 15 days)

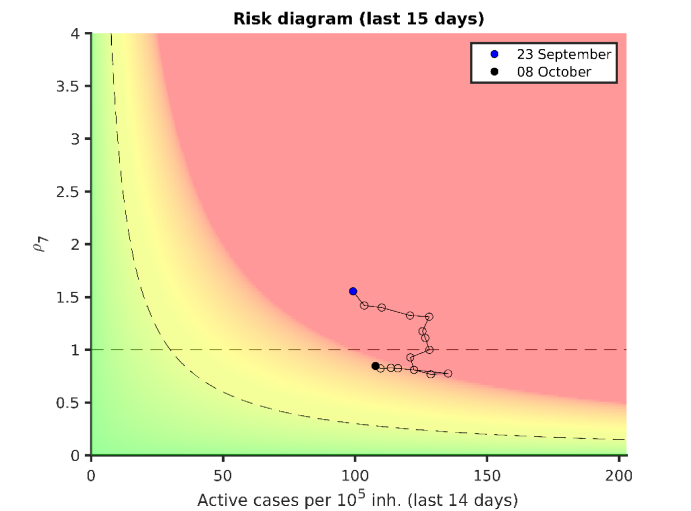
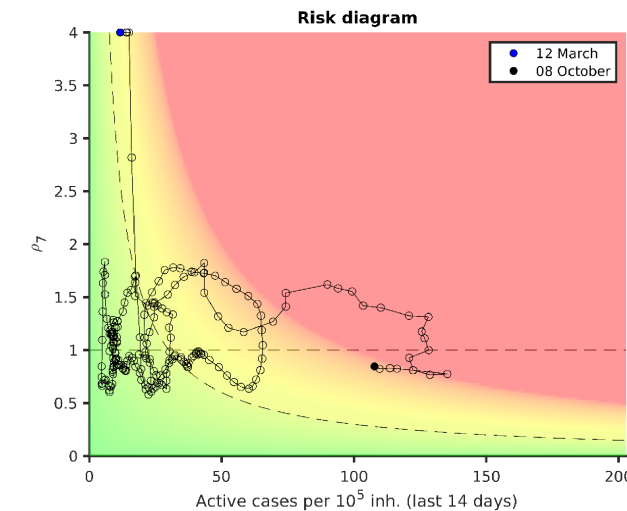
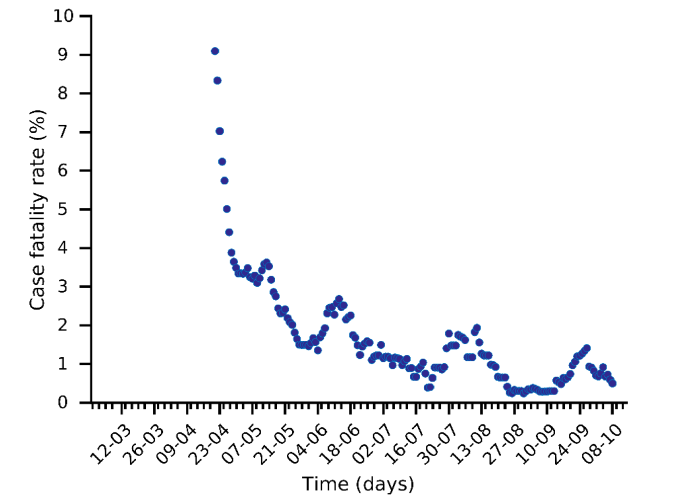
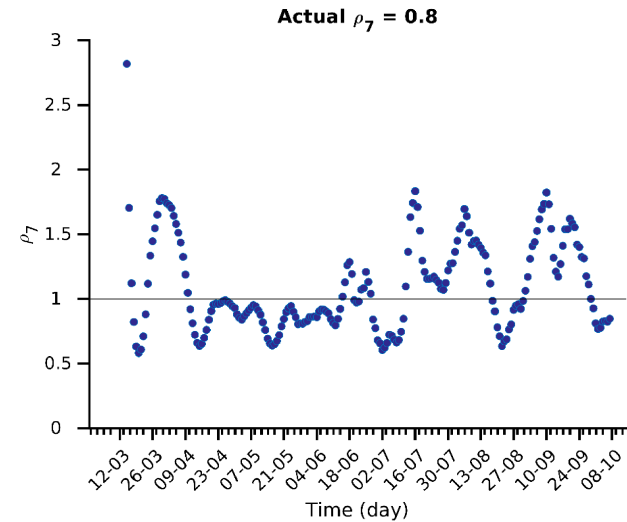
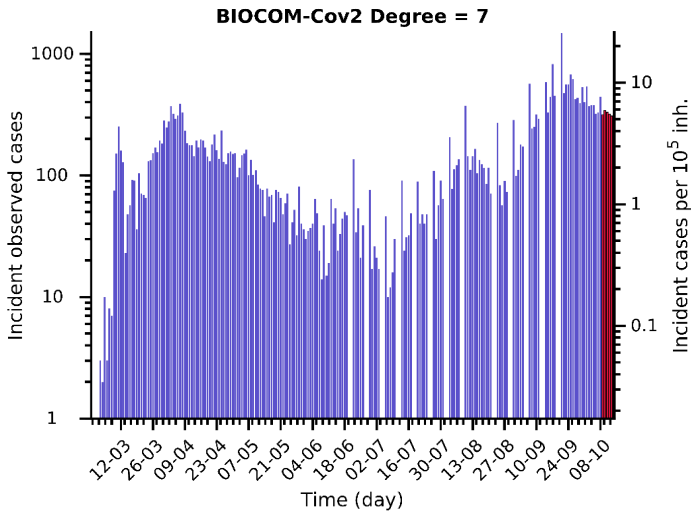
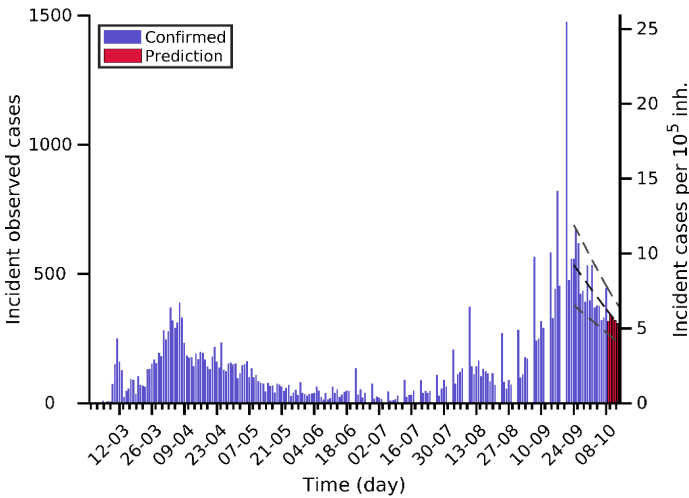


Denmark 08-10-2020. Pop: 5.8M. Cumulative incidence: 538/10⁵

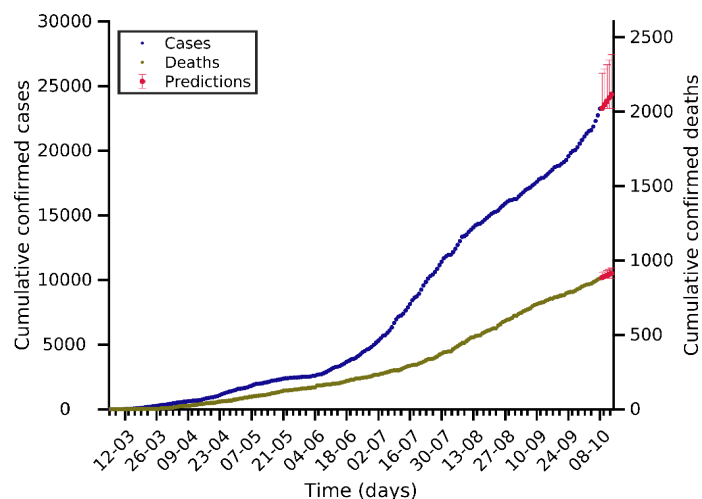


Predictions for next days		
Day	Number of cases	95% Confidence Interval
09-10-2020	31473 (+317)	[31156 - 32110]
11-10-2020	32145 (+331)	[31488 - 32802]
13-10-2020	32774 (+309)	[32077 - 33471]

Current indicators		
A ₁₄	EPG	CFR
108	91	0.50 %



Bulgaria 08-10-2020. Pop: 6.9M. Cumulative incidence: 335/10⁵

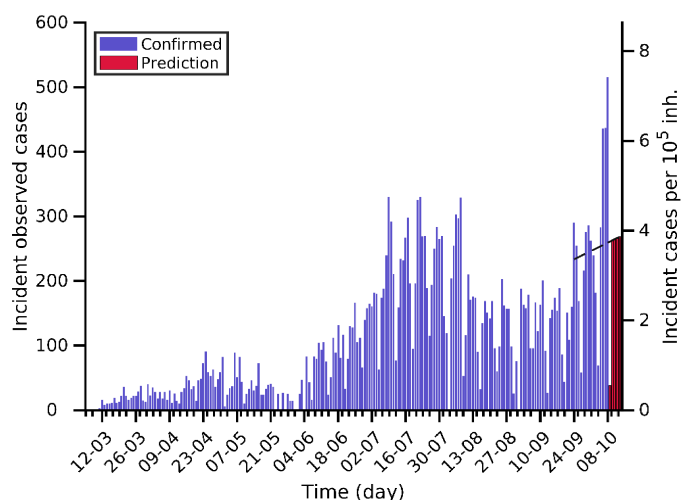


Predictions for next days

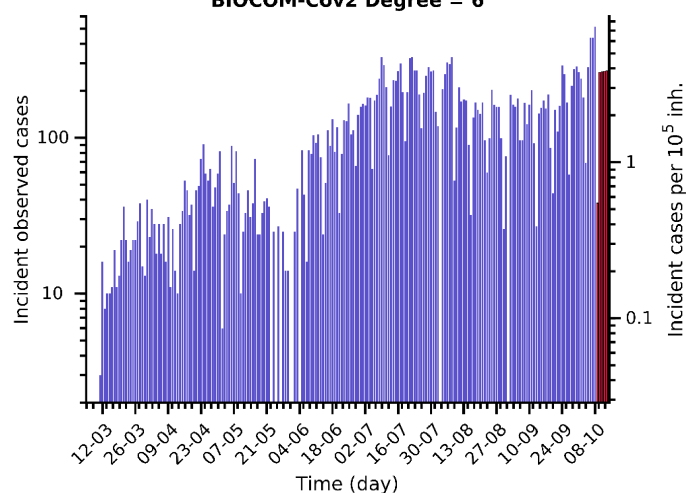
Day	Number of cases	95% Confidence Interval
09-10-2020	23297 (+38)	[23259 - 26008]
11-10-2020	23825 (+265)	[23259 - 26651]
13-10-2020	24360 (+269)	[23259 - 27439]

Current indicators

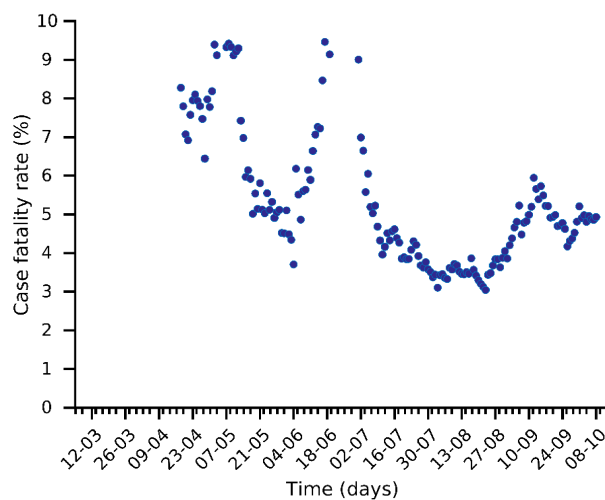
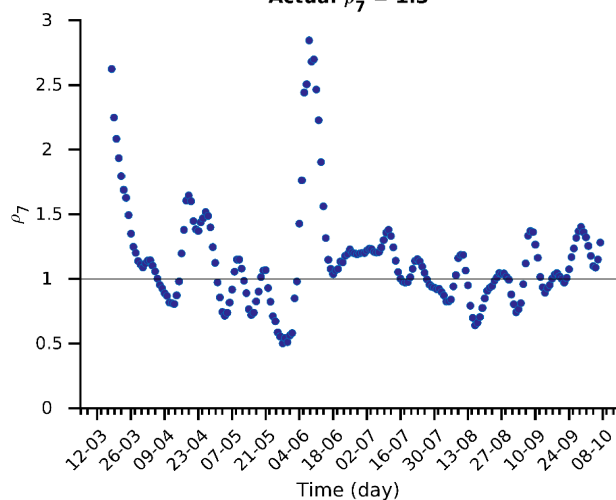
A ₁₄	EPG	CFR
53	68	4.93 %



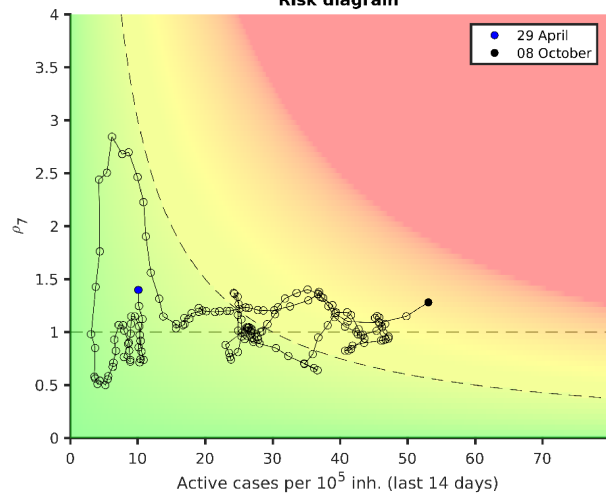
BIOCOM-Cov2 Degree = 6



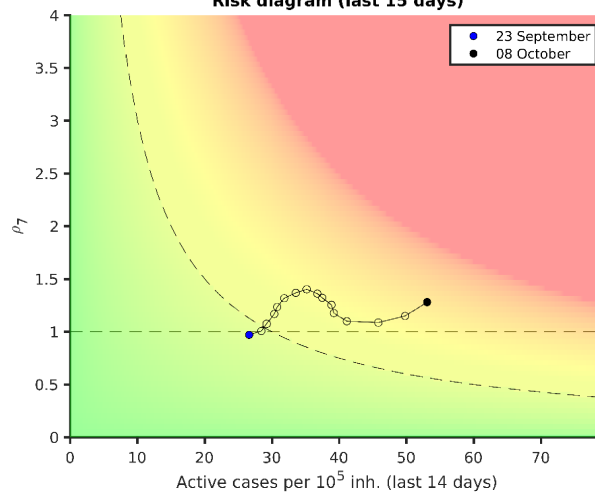
Actual $\rho_7 = 1.3$



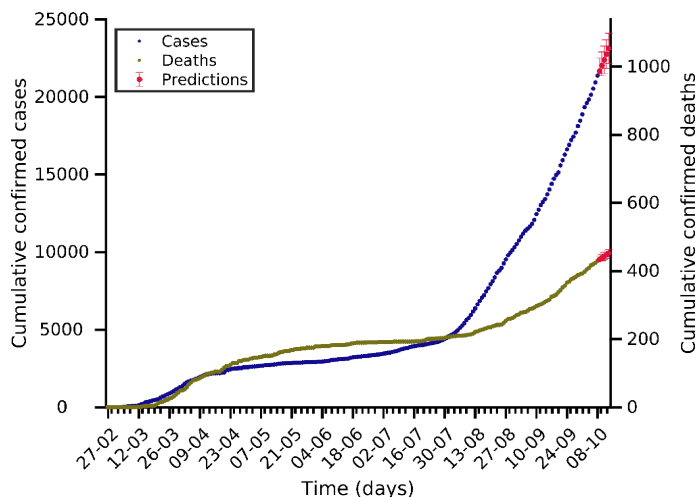
Risk diagram



Risk diagram (last 15 days)



Greece 08-10-2020. Pop: 10.4M. Cumulative incidence: 205/10⁵

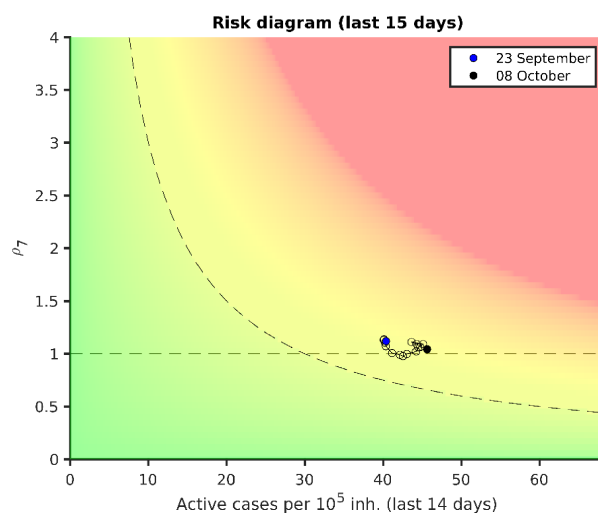
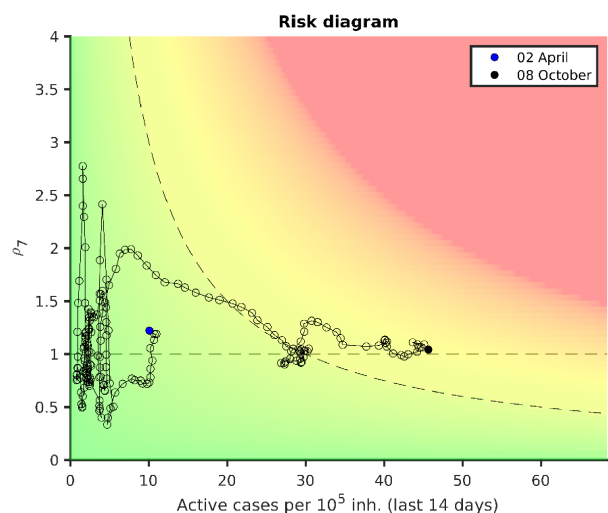
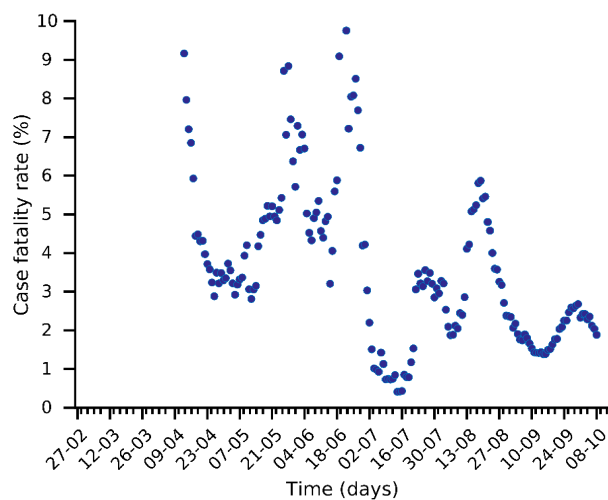
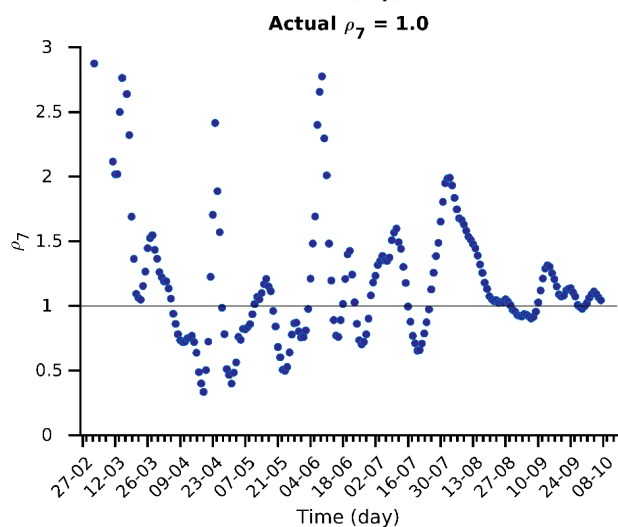
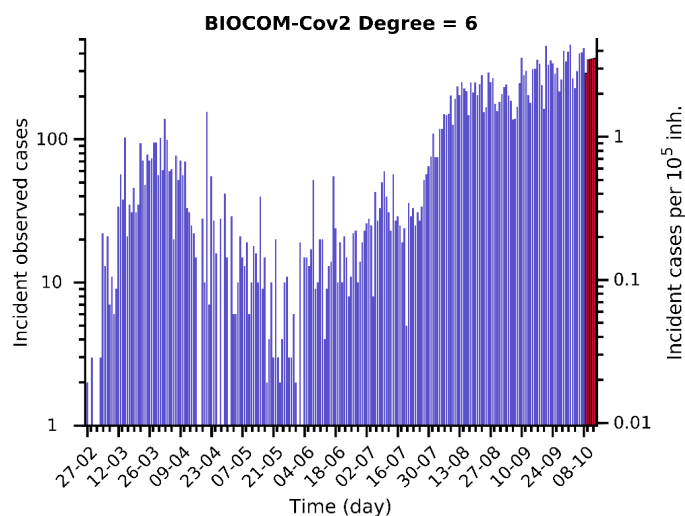
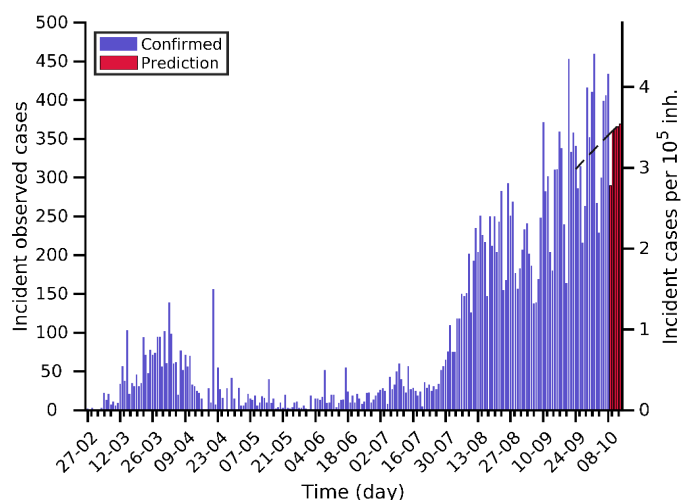


Predictions for next days

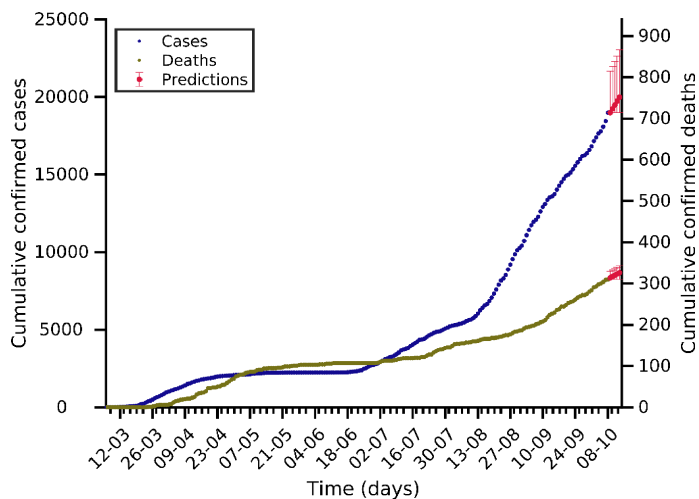
Day	Number of cases	95% Confidence Interval
09-10-2020	21671 (+290)	[21381 - 22524]
11-10-2020	22394 (+363)	[21504 - 23285]
13-10-2020	23130 (+369)	[22156 - 24103]

Current indicators

A ₁₄	EPG	CFR
46	48	1.88 %



Croatia 08-10-2020. Pop: 4.1M. Cumulative incidence: 463/10⁵

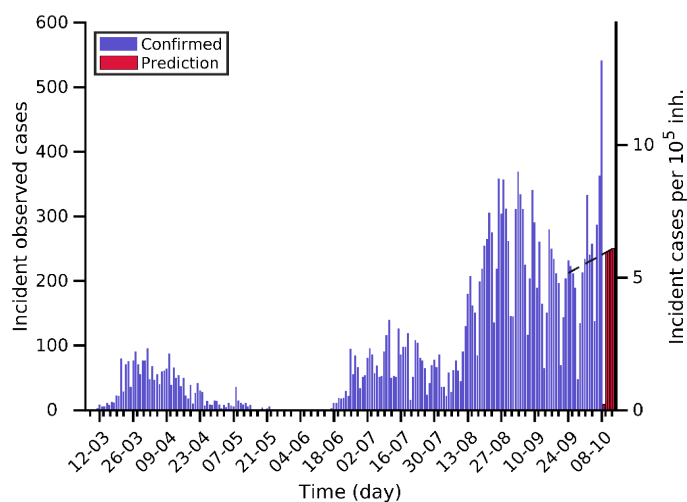


Predictions for next days

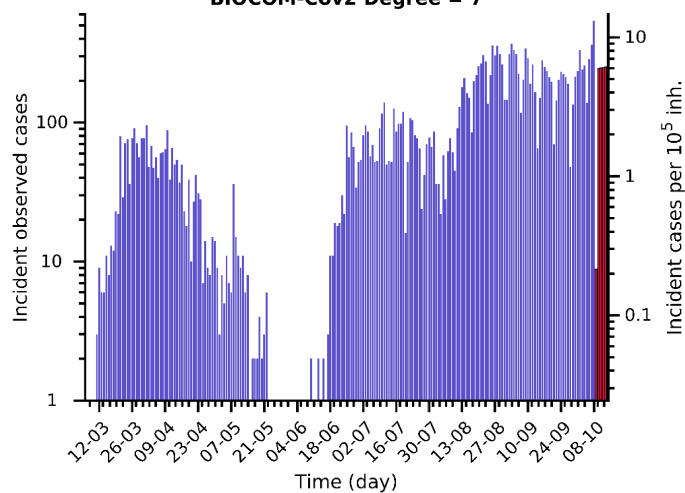
Day	Number of cases	95% Confidence Interval
09-10-2020	18998 (+9)	[18989 - 21679]
11-10-2020	19489 (+247)	[18989 - 22285]
13-10-2020	19988 (+251)	[18989 - 23041]

Current indicators

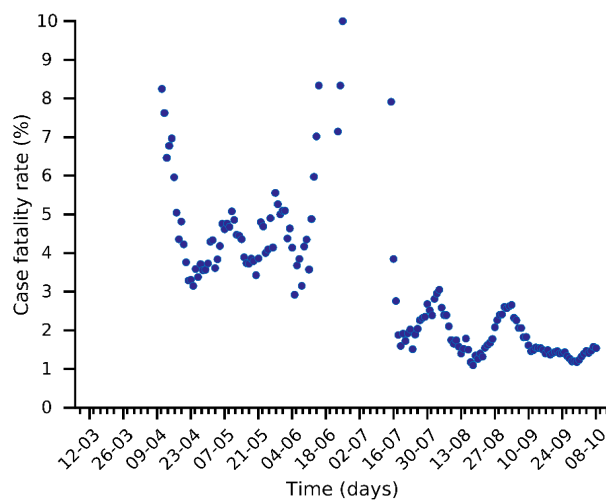
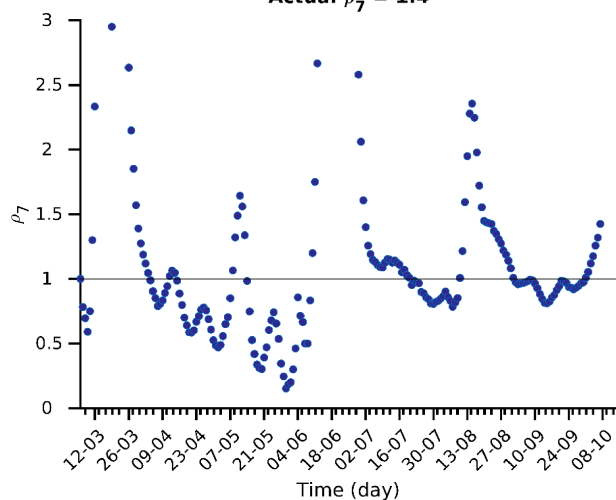
A ₁₄	EPG	CFR
83	119	1.54 %



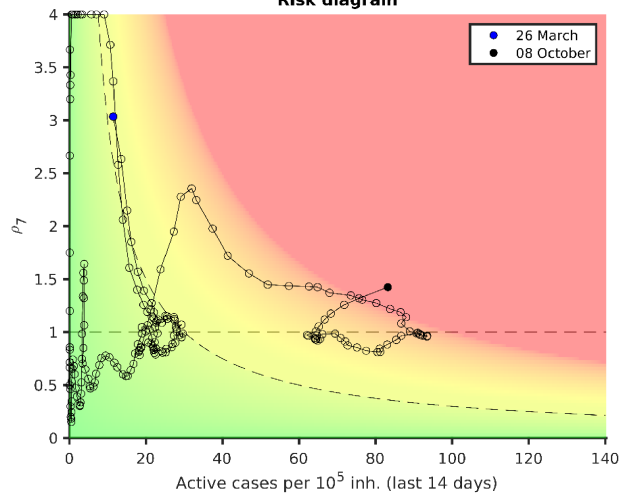
BIOCOM-Cov2 Degree = 7



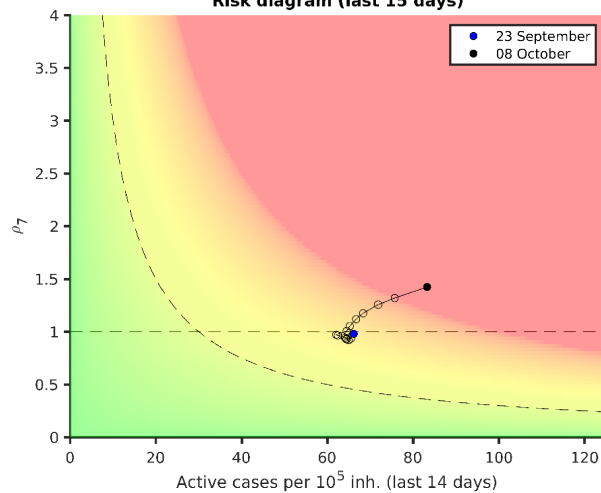
Actual $\rho_7 = 1.4$



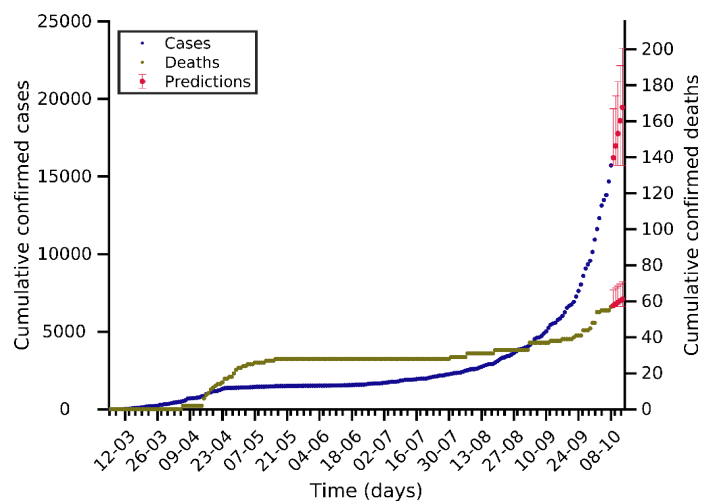
Risk diagram



Risk diagram (last 15 days)



Slovakia 08-10-2020. Pop: 5.5M. Cumulative incidence: 288/10⁵

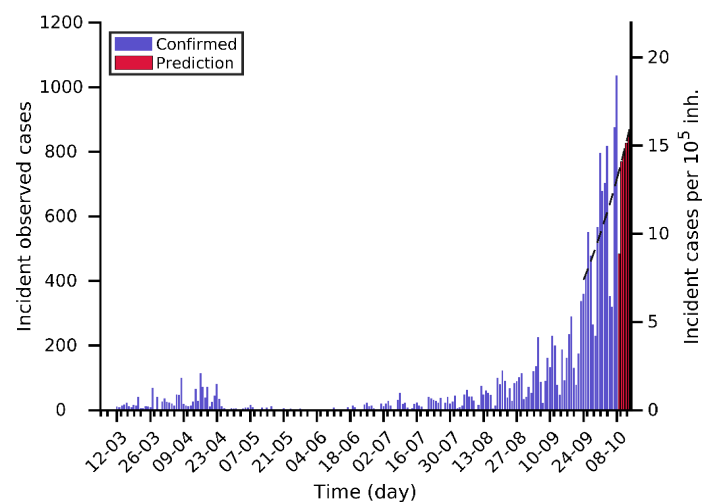


Predictions for next days

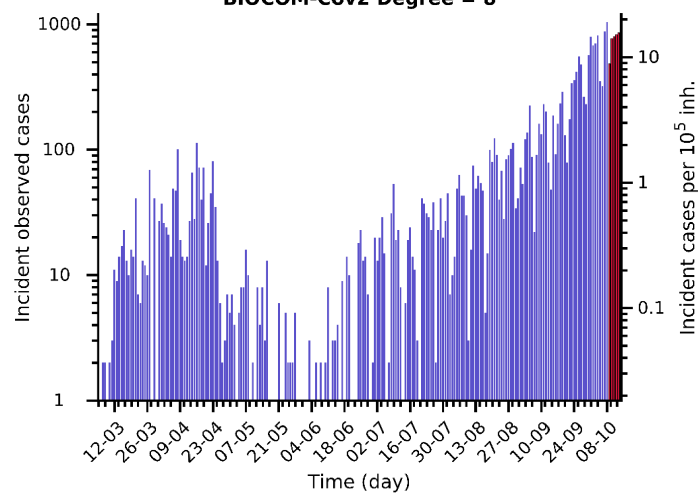
Day	Number of cases	95% Confidence Interval
09-10-2020	16210 (+484)	[15726 - 19369]
11-10-2020	17778 (+798)	[15726 - 21125]
13-10-2020	19462 (+857)	[15726 - 23281]

Current indicators

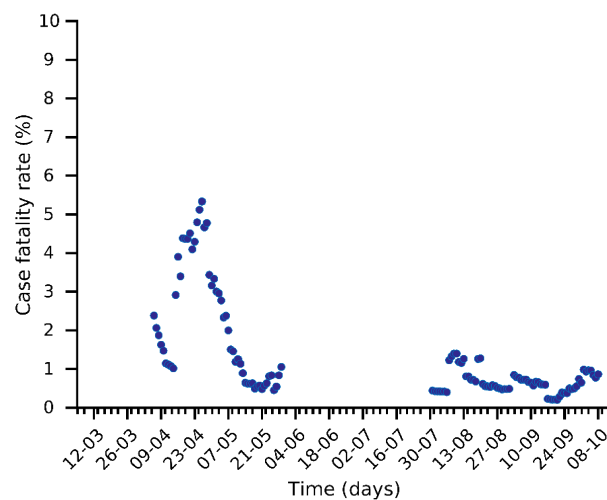
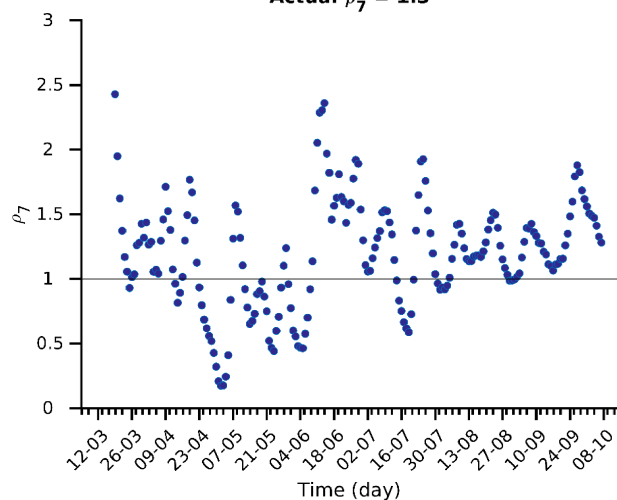
A ₁₄	EPG	CFR
148	190	0.86 %



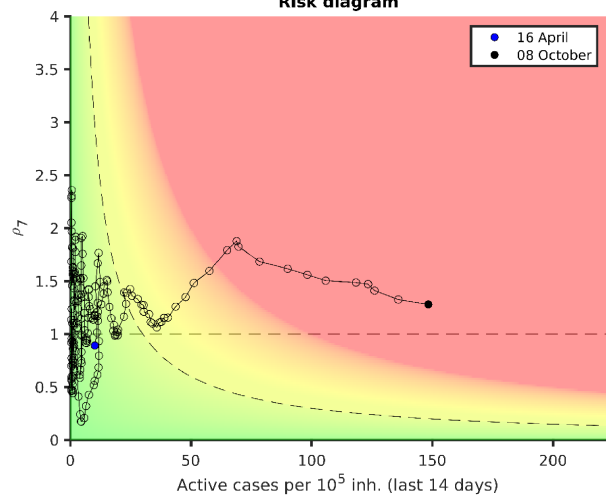
BIOCOM-Cov2 Degree = 8



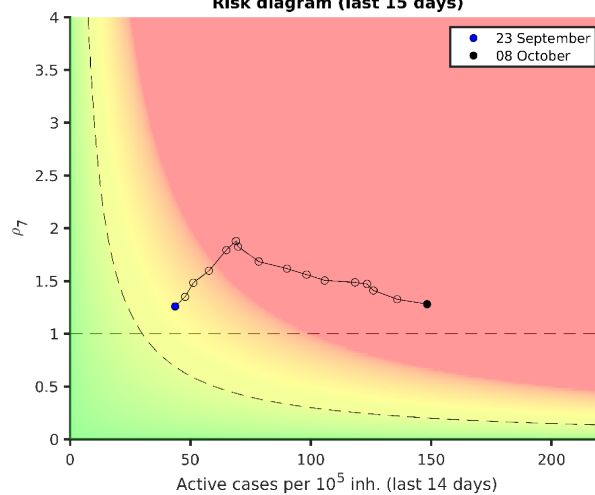
Actual $\rho_7 = 1.3$



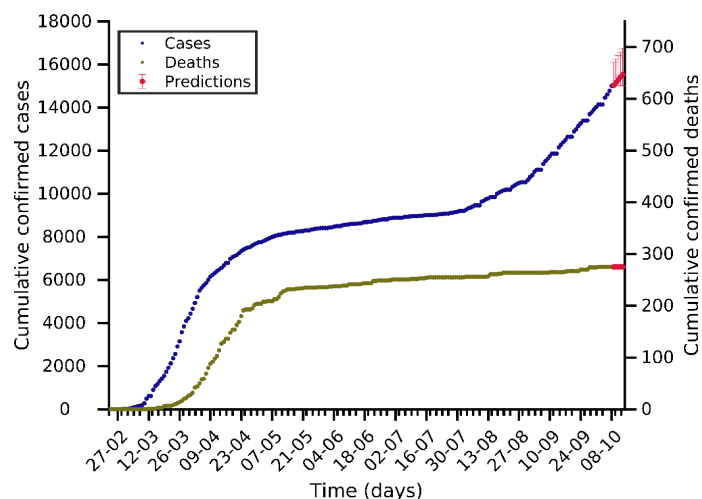
Risk diagram



Risk diagram (last 15 days)



Norway 08-10-2020. Pop: 5.4M. Cumulative incidence: 277/10⁵

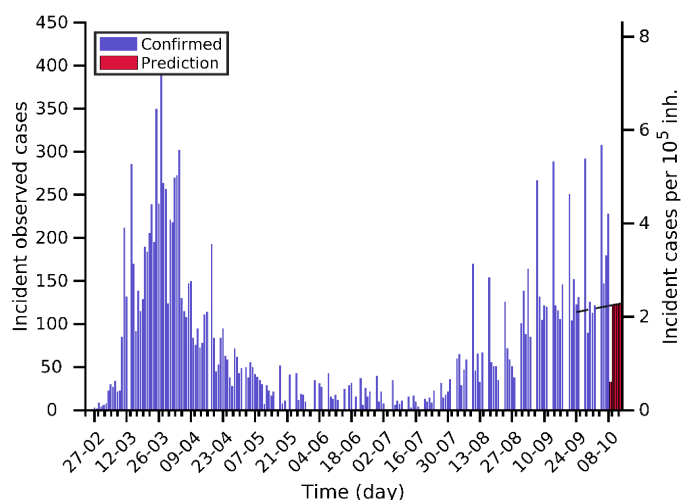


Predictions for next days

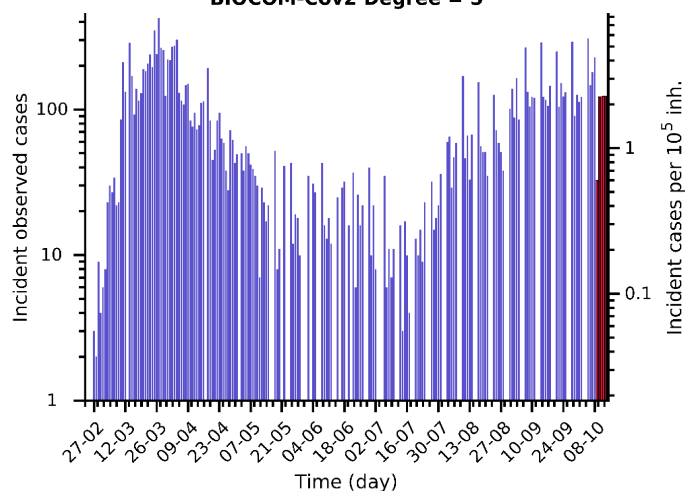
Day	Number of cases	95% Confidence Interval
09-10-2020	15045 (+33)	[15012 - 16120]
11-10-2020	15289 (+123)	[15012 - 16409]
13-10-2020	15536 (+124)	[15012 - 16752]

Current indicators

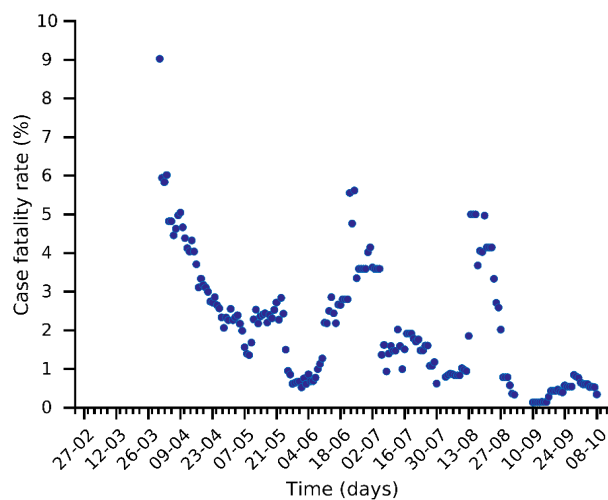
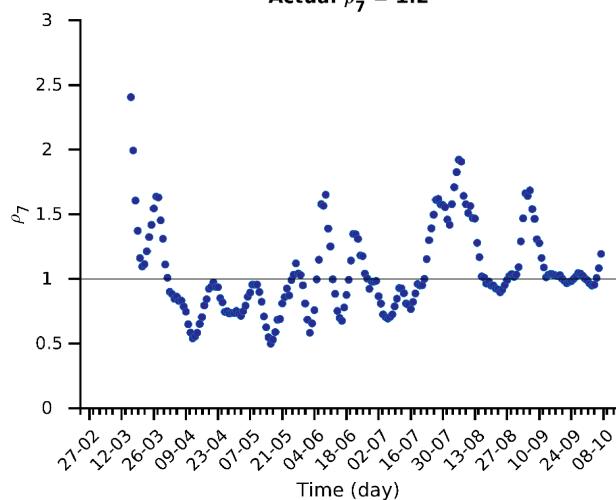
A ₁₄	EPG	CFR
32	38	0.34 %



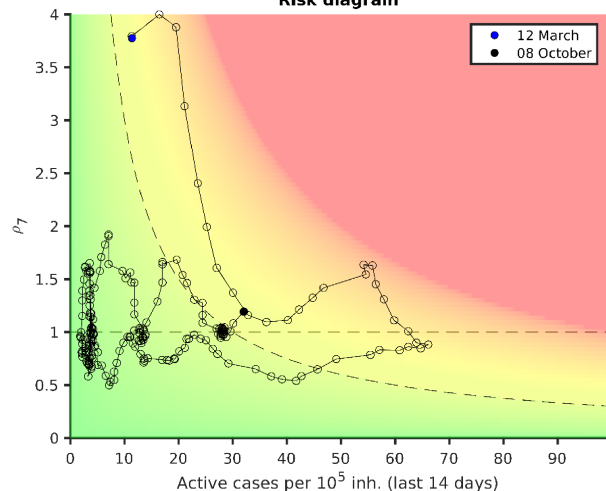
BIOCOM-Cov2 Degree = 5



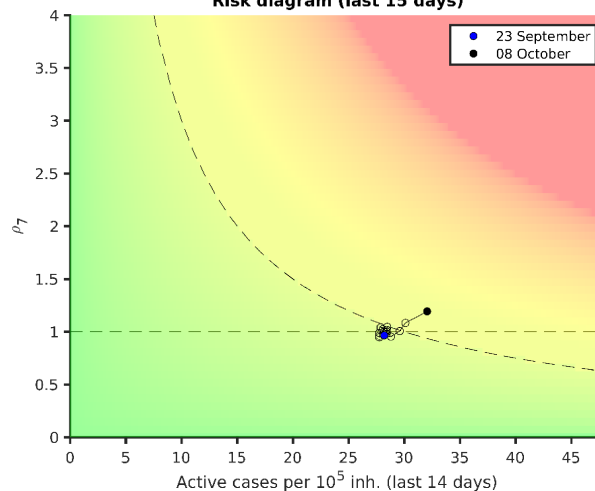
Actual $\rho_7 = 1.2$



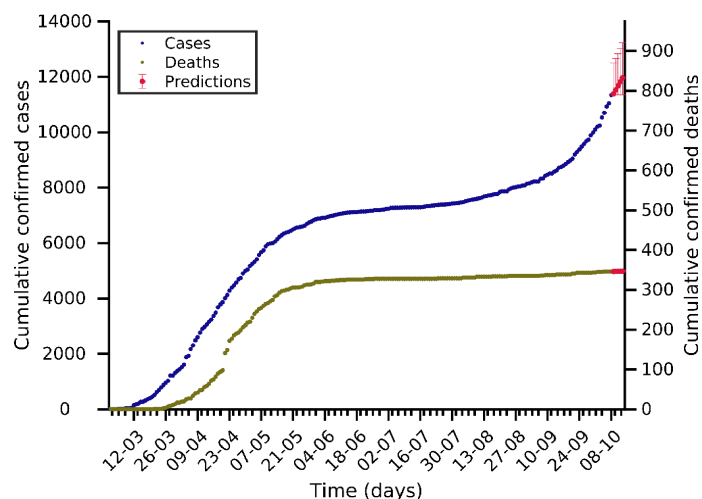
Risk diagram



Risk diagram (last 15 days)



Finland 08-10-2020. Pop: 5.5M. Cumulative incidence: 205/10⁵

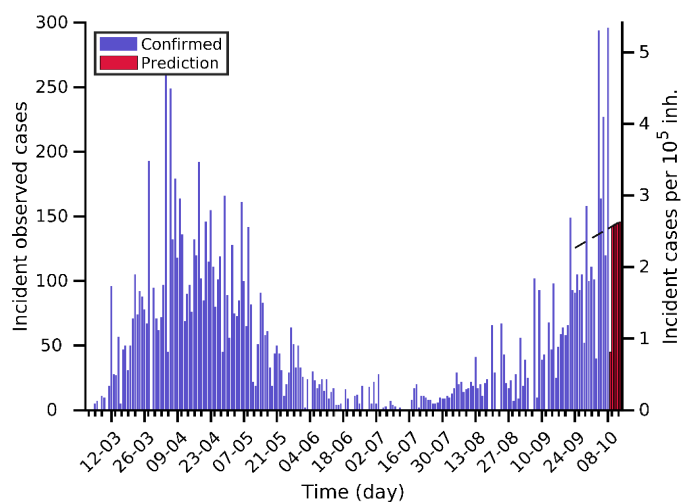


Predictions for next days

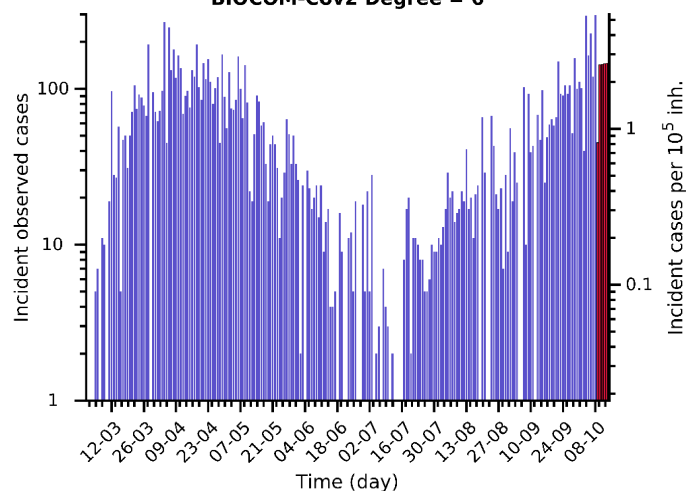
Day	Number of cases	95% Confidence Interval
09-10-2020	11390 (+45)	[11345 - 12504]
11-10-2020	11676 (+144)	[11345 - 12838]
13-10-2020	11967 (+146)	[11345 - 13234]

Current indicators

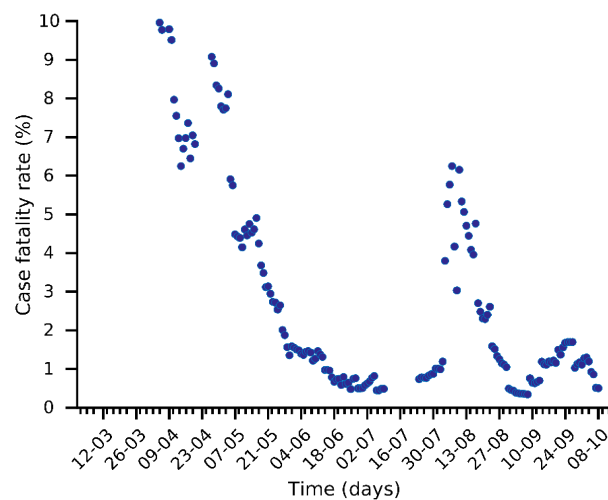
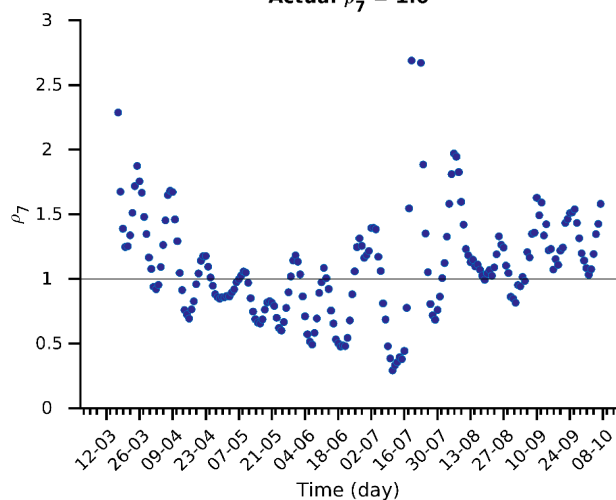
A ₁₄	EPG	CFR
35	56	0.50 %



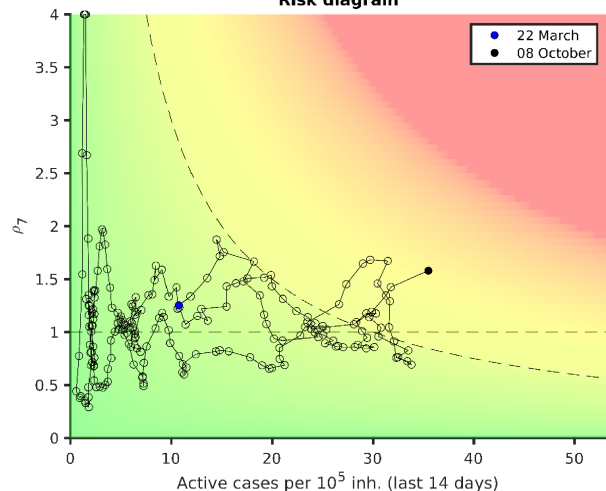
BIOCOM-Cov2 Degree = 6



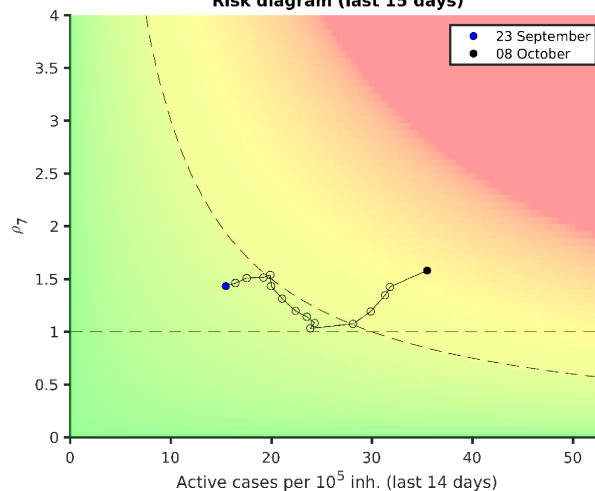
Actual $\rho_7 = 1.6$



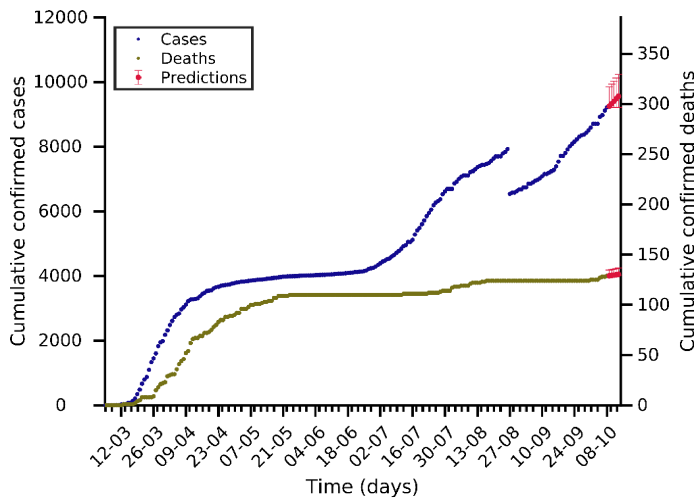
Risk diagram



Risk diagram (last 15 days)



Luxembourg 08-10-2020. Pop: 0.6M. Cumulative incidence: 1473/10⁵

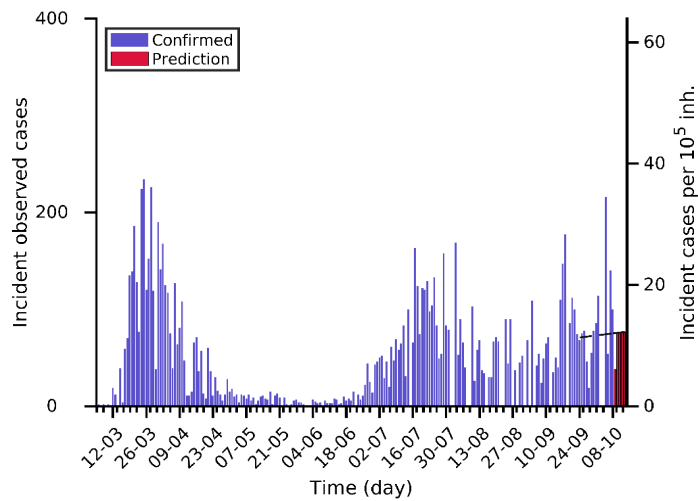


Predictions for next days

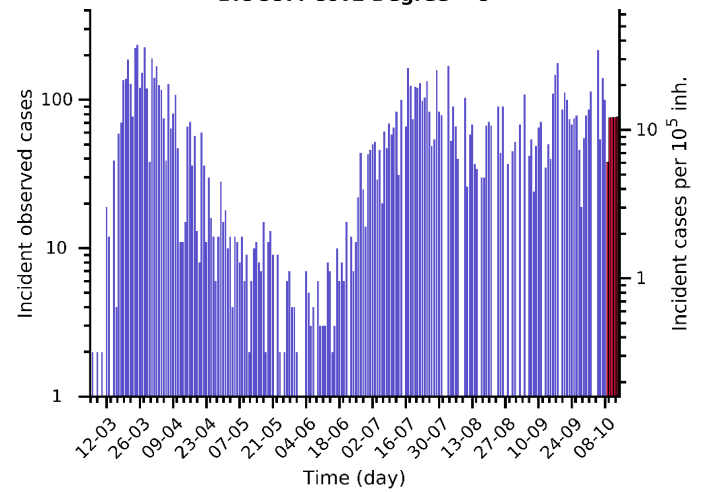
Day	Number of cases	95% Confidence Interval
09-10-2020	9257 (+38)	[9219 - 9854]
11-10-2020	9409 (+76)	[9219 - 10030]
13-10-2020	9561 (+77)	[9219 - 10236]

Current indicators

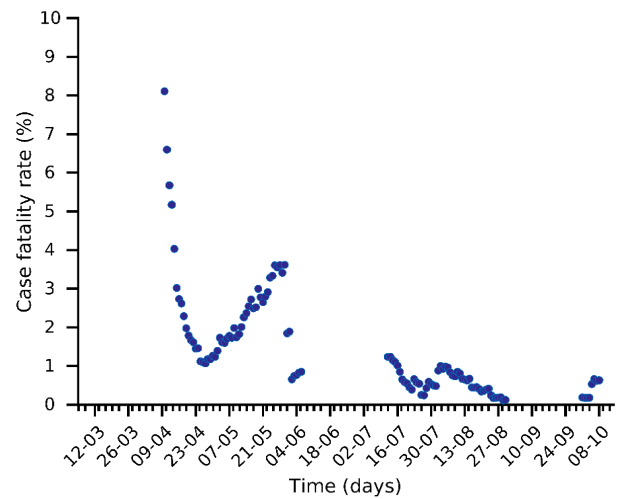
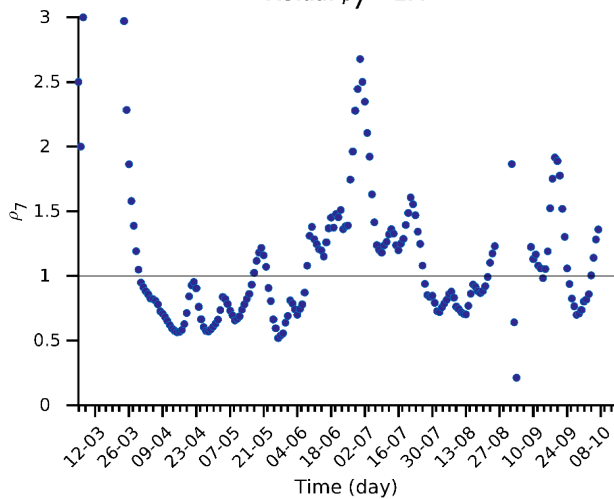
A ₁₄	EPG	CFR
169	230	0.63 %



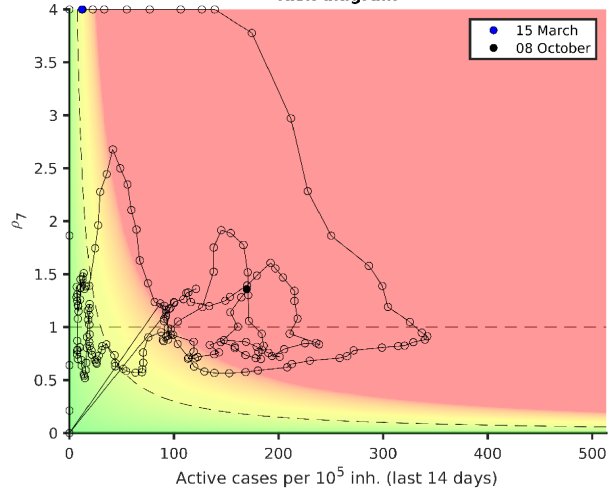
BIOCOM-Cov2 Degree = 9



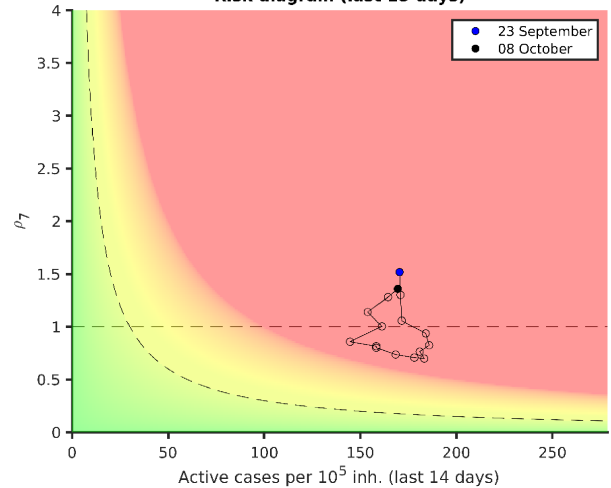
Actual $\rho_7 = 1.4$



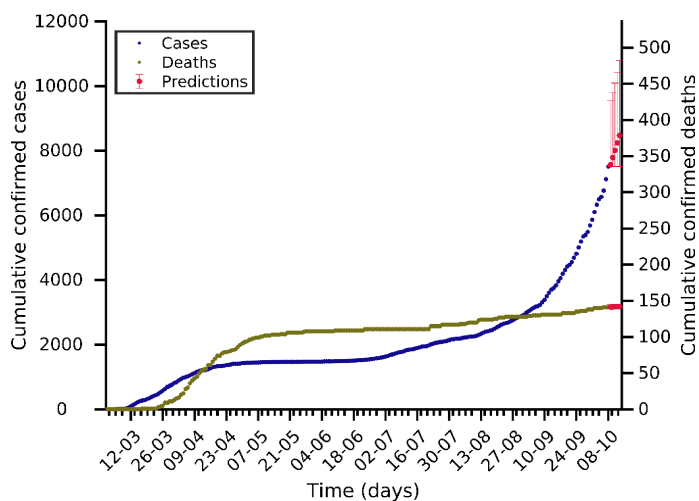
Risk diagram



Risk diagram (last 15 days)



Slovenia 08-10-2020. Pop: 2.1M. Cumulative incidence: 361/10⁵

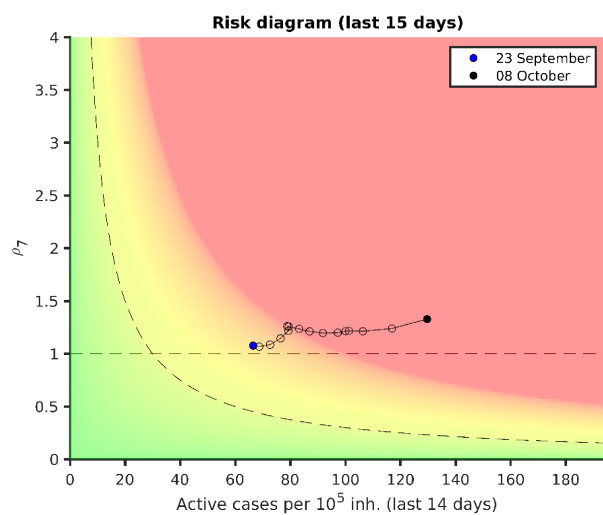
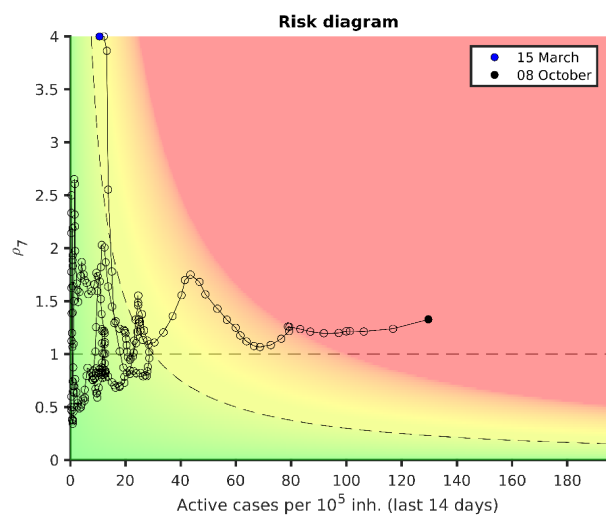
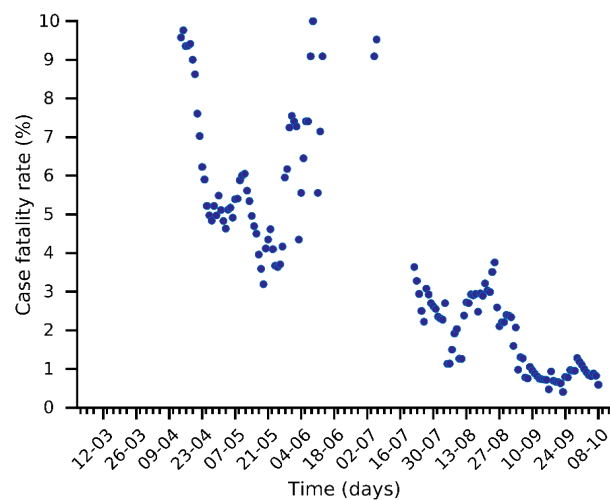
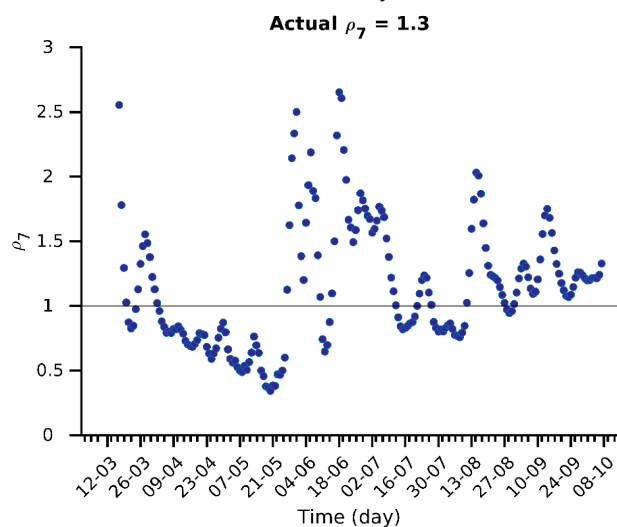
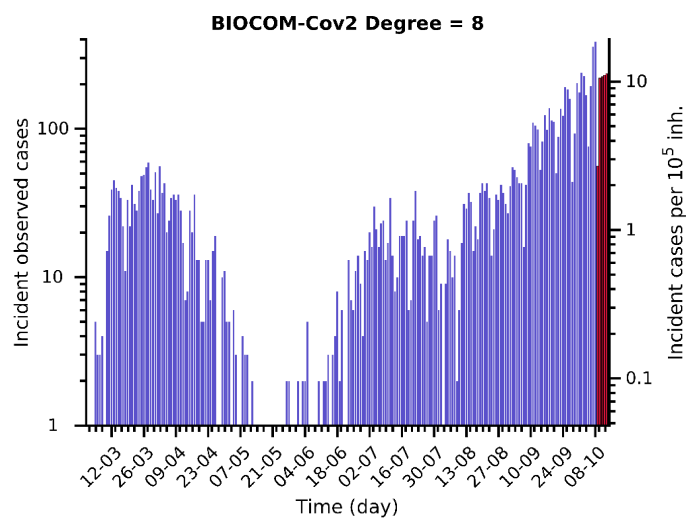
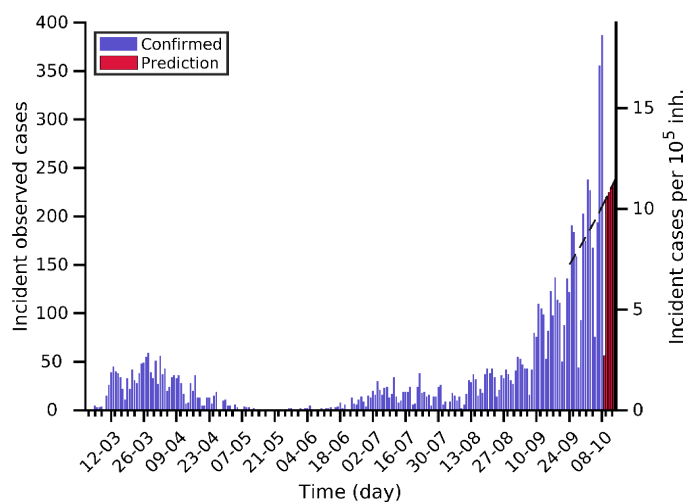


Predictions for next days

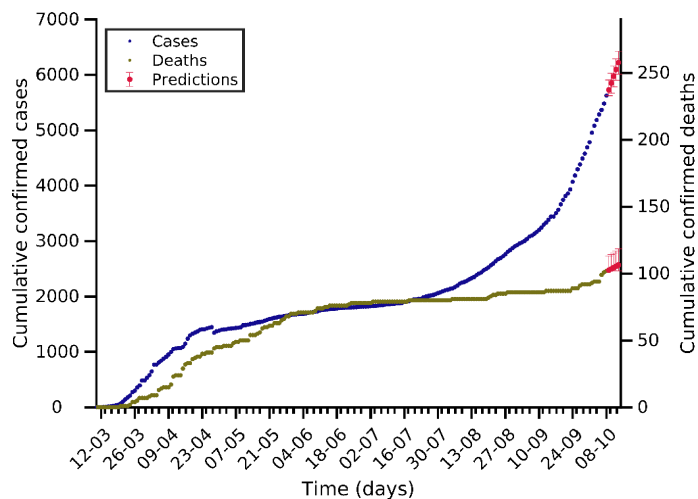
Day	Number of cases	95% Confidence Interval
09-10-2020	7567 (+56)	[7511 - 9551]
11-10-2020	8012 (+225)	[7511 - 10096]
13-10-2020	8476 (+235)	[7511 - 10797]

Current indicators

A ₁₄	EPG	CFR
130	172	0.59 %



Lithuania 08-10-2020. Pop: 2.7M. Cumulative incidence: 207/10⁵

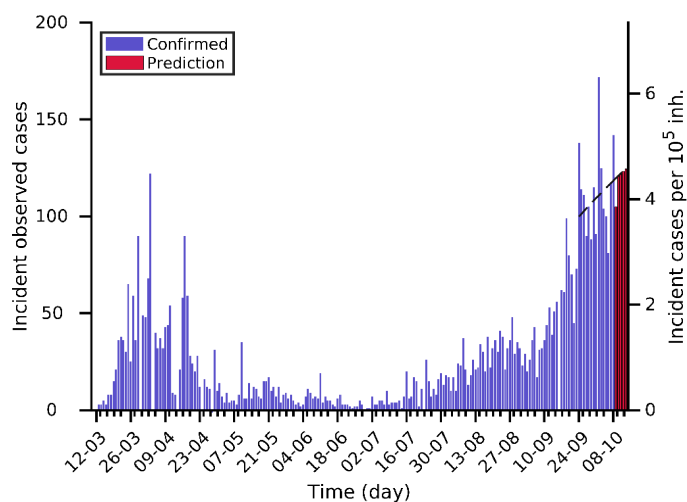


Predictions for next days

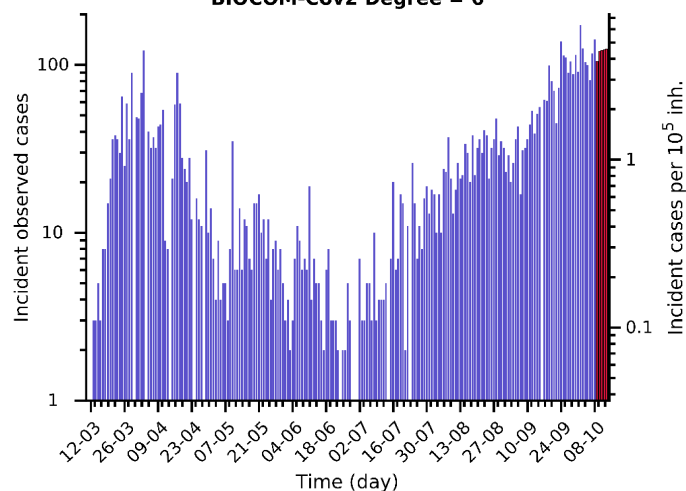
Day	Number of cases	95% Confidence Interval
09-10-2020	5730 (+105)	[5625 - 5909]
11-10-2020	5973 (+122)	[5786 - 6160]
13-10-2020	6221 (+124)	[6016 - 6426]

Current indicators

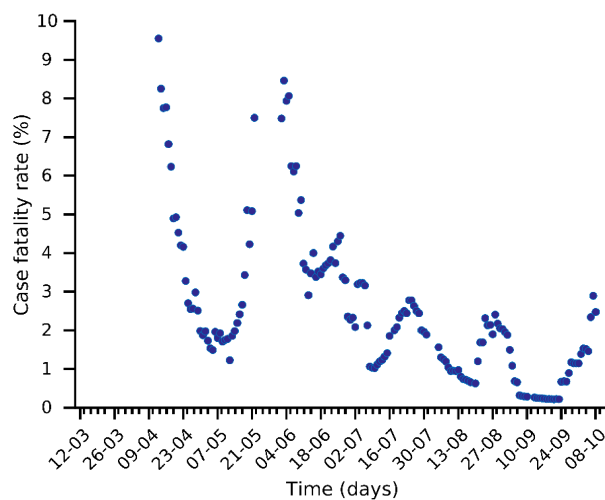
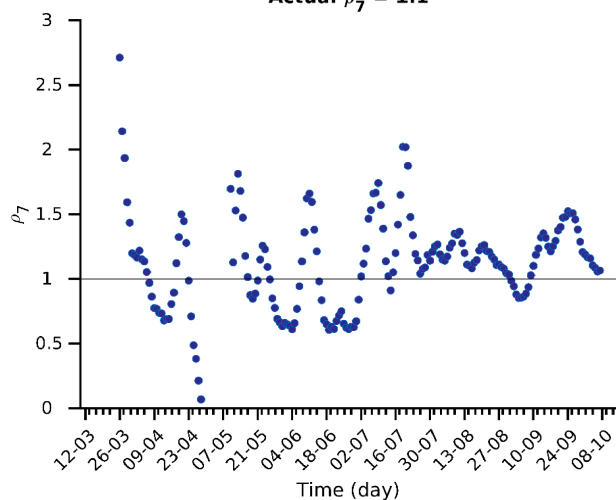
A ₁₄	EPG	CFR
57	61	2.47 %



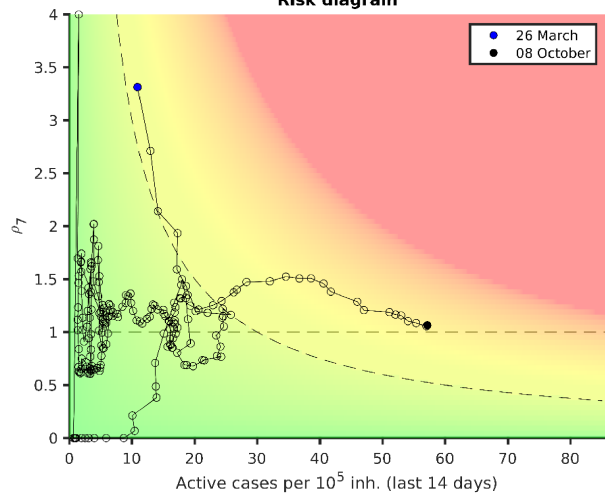
BIOCOM-Cov2 Degree = 6



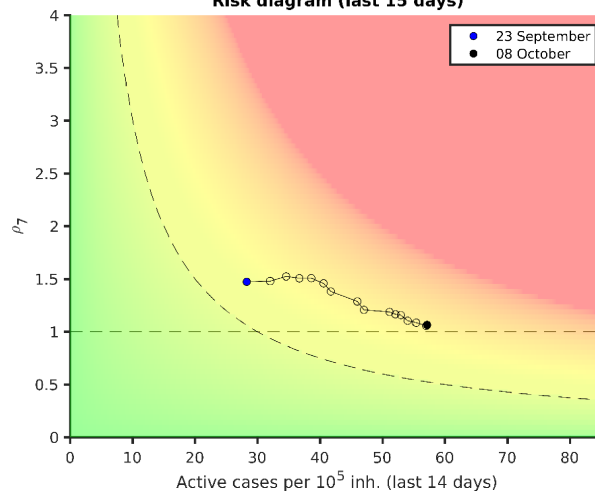
Actual $\rho_7 = 1.1$



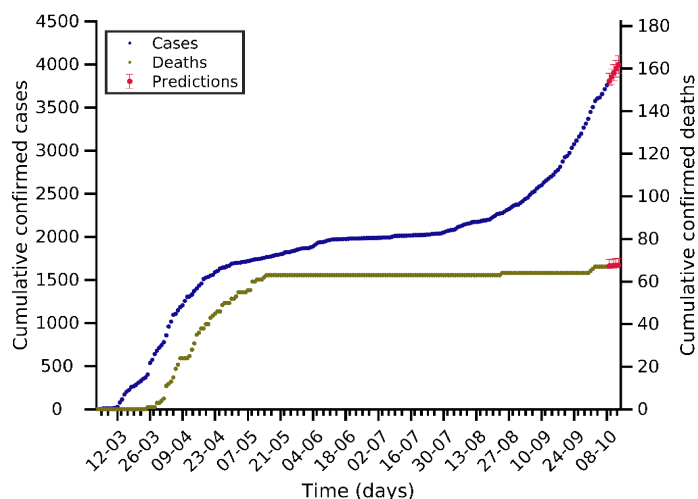
Risk diagram



Risk diagram (last 15 days)



Estonia 08-10-2020. Pop: 1.3M. Cumulative incidence: 283/10⁵

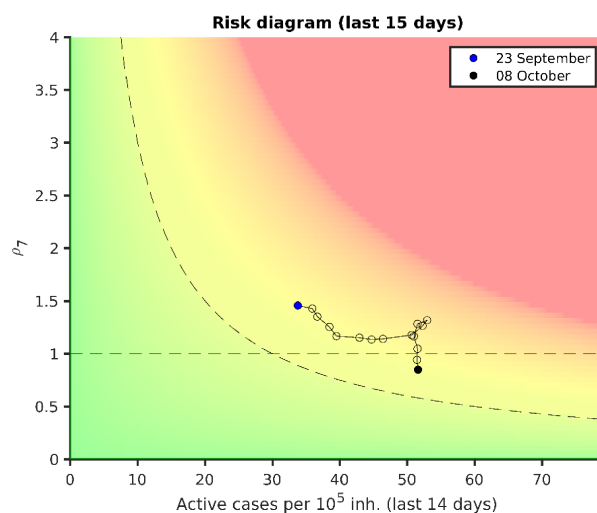
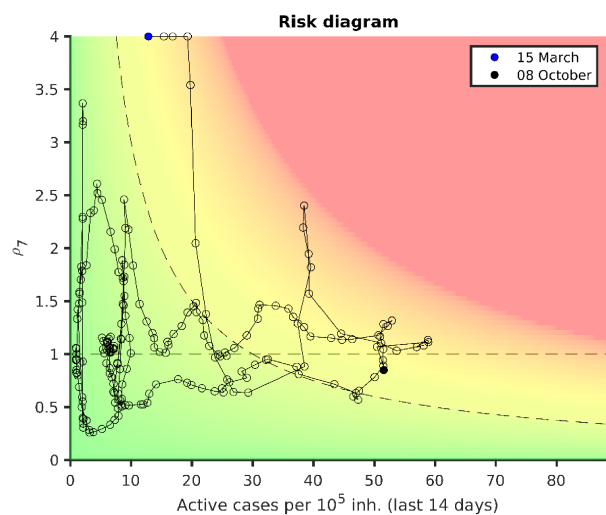
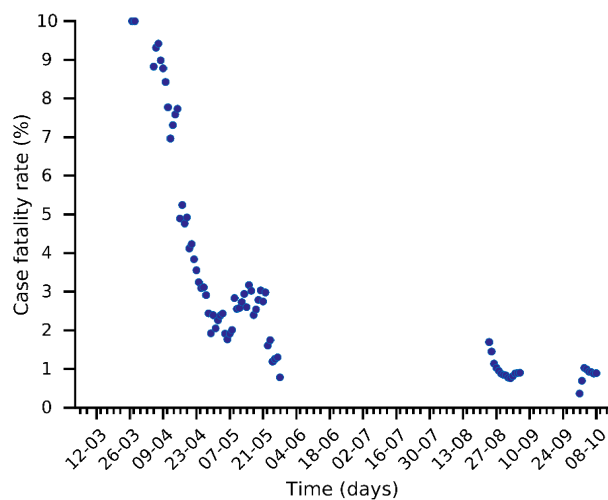
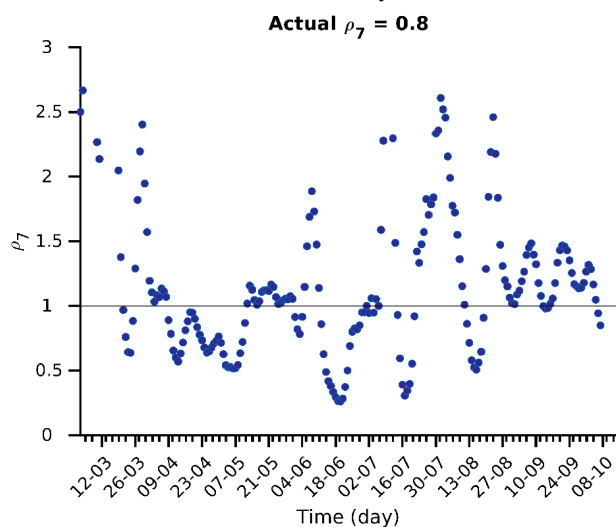
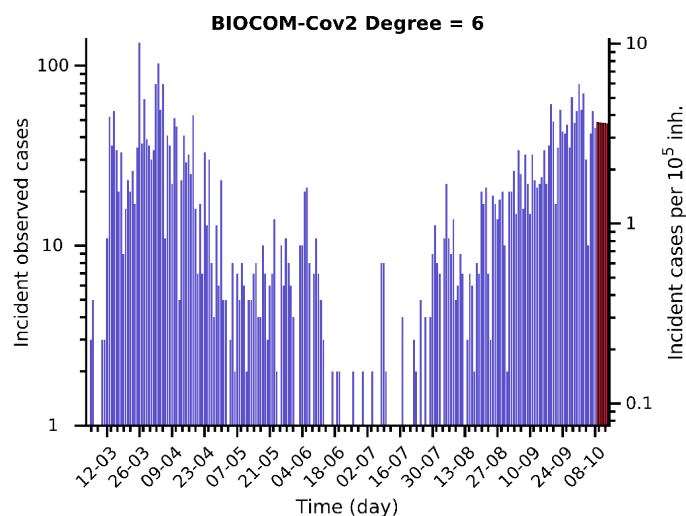
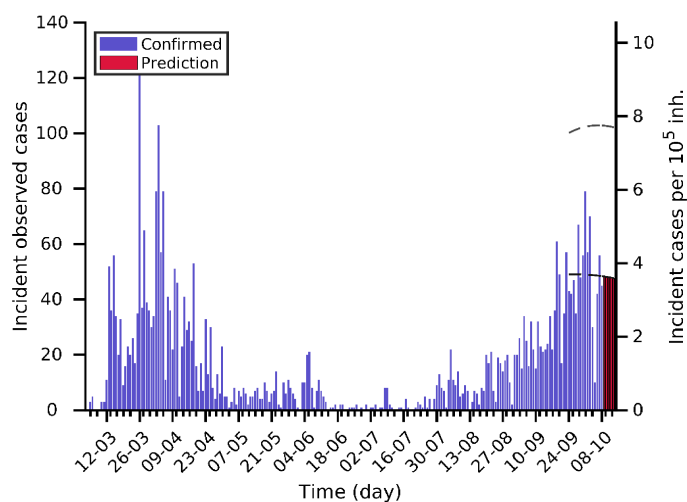


Predictions for next days

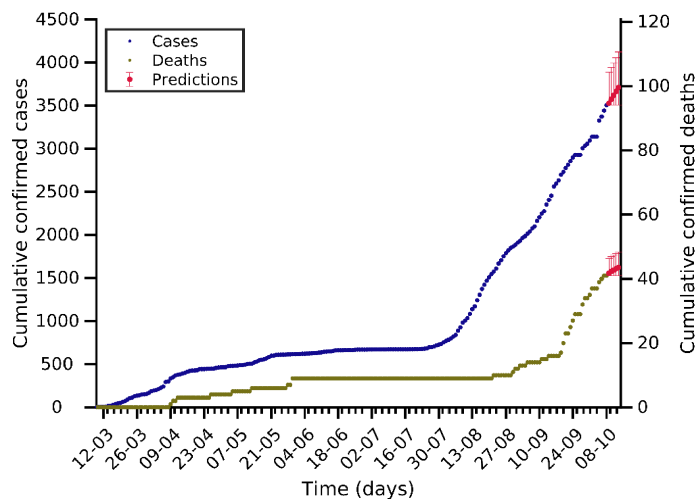
Day	Number of cases	95% Confidence Interval
09-10-2020	3809 (+49)	[3760 - 3898]
11-10-2020	3905 (+48)	[3811 - 3998]
13-10-2020	4000 (+48)	[3899 - 4101]

Current indicators

A ₁₄	EPG	CFR
52	44	0.89 %



Malta 08-10-2020. Pop: 0.4M. Cumulative incidence: 794/10⁵

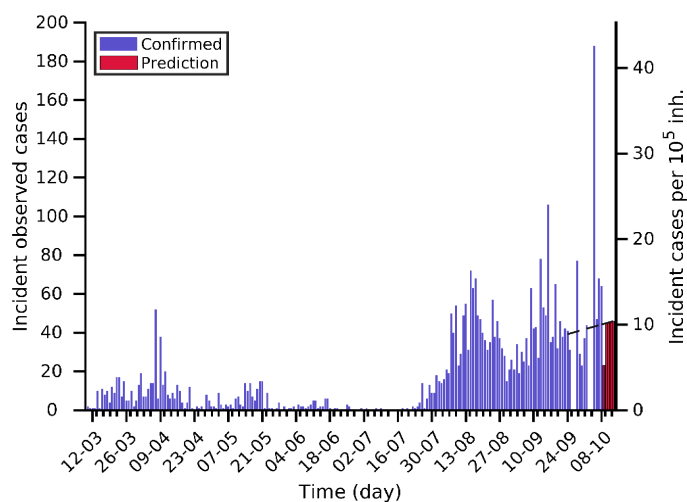


Predictions for next days

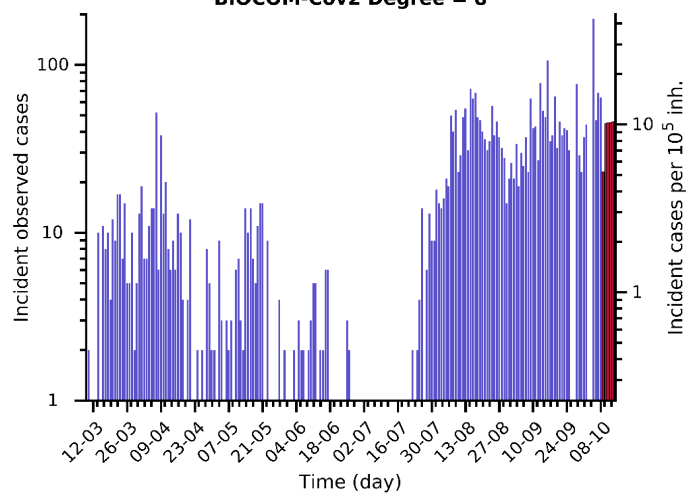
Day	Number of cases	95% Confidence Interval
09-10-2020	3529 (+23)	[3506 - 3890]
11-10-2020	3619 (+45)	[3506 - 3996]
13-10-2020	3711 (+46)	[3506 - 4122]

Current indicators

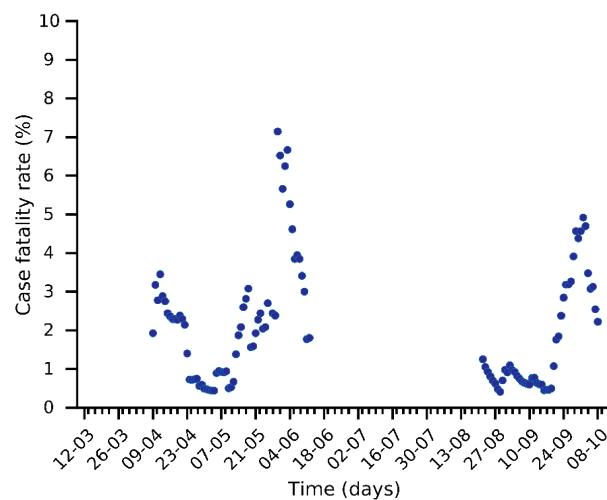
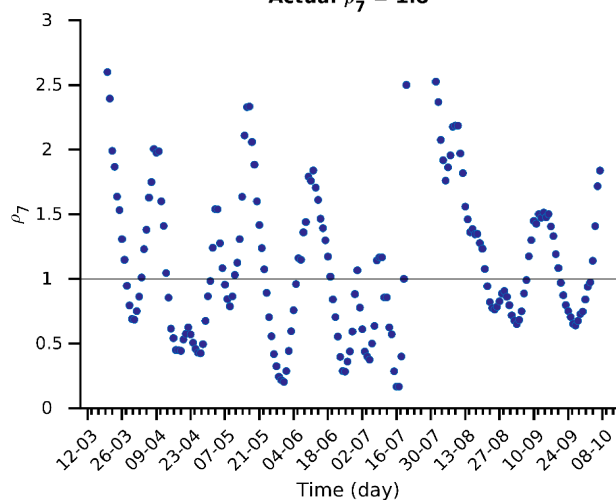
A ₁₄	EPG	CFR
138	253	2.22 %



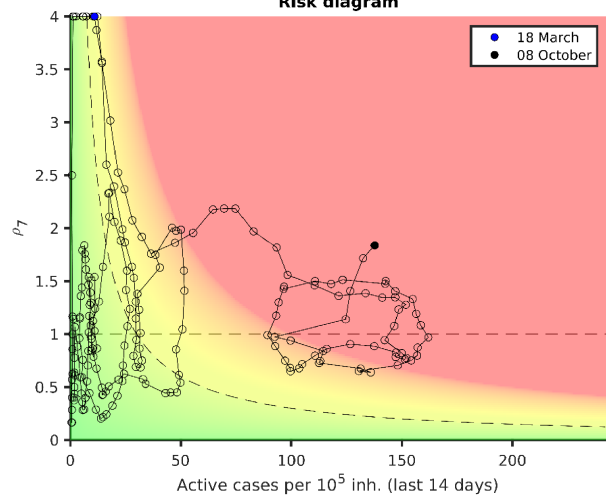
BIOCOM-Cov2 Degree = 8



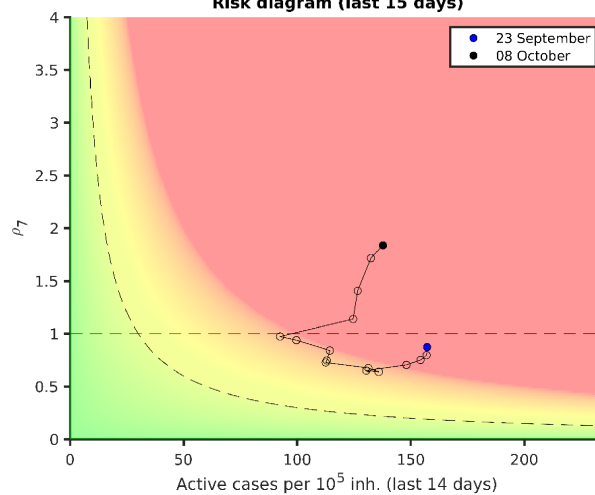
Actual $\rho_7 = 1.8$



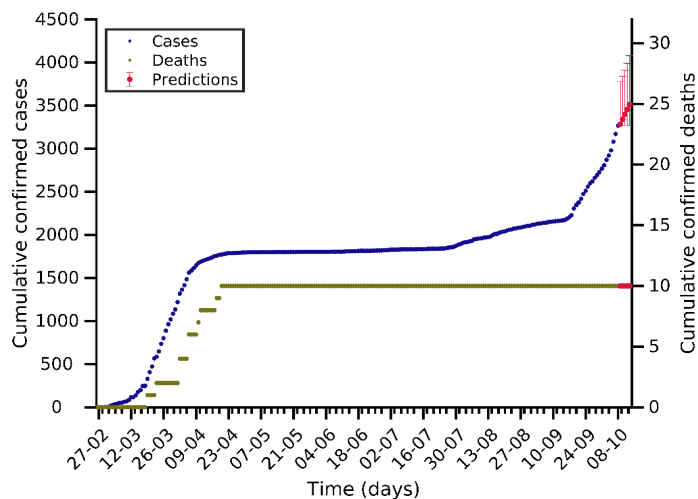
Risk diagram



Risk diagram (last 15 days)



Iceland 08-10-2020. Pop: 0.3M. Cumulative incidence: 957/10⁵

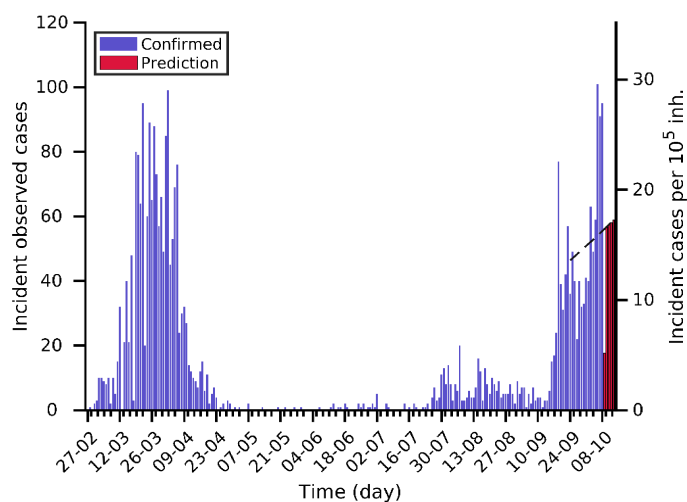


Predictions for next days

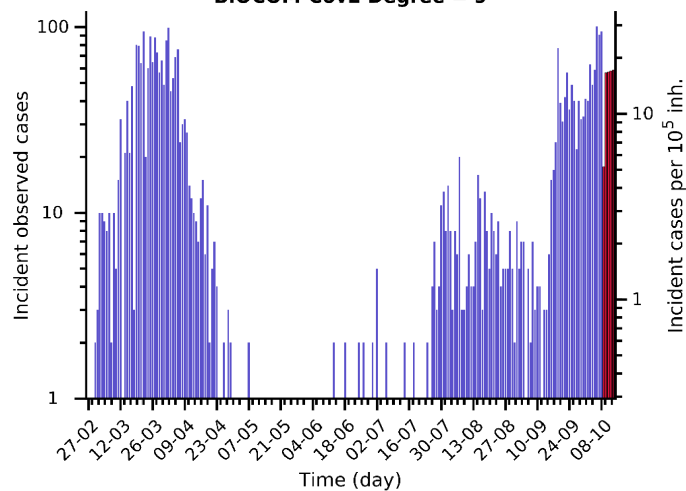
Day	Number of cases	95% Confidence Interval
09-10-2020	3285 (+18)	[3267 - 3777]
11-10-2020	3399 (+57)	[3267 - 3913]
13-10-2020	3516 (+59)	[3267 - 4080]

Current indicators

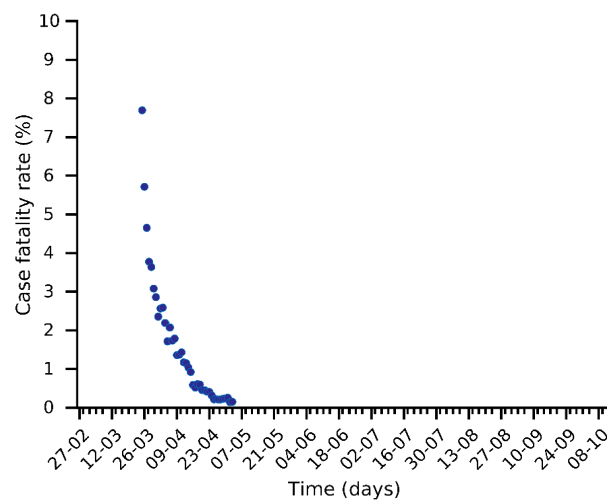
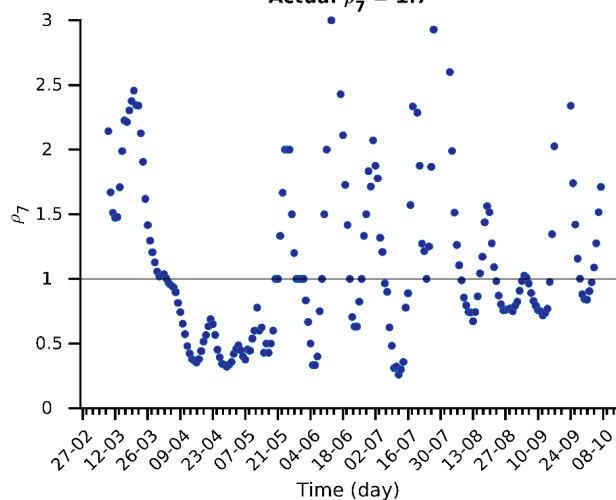
A ₁₄	EPG	CFR
221	379	0.00 %



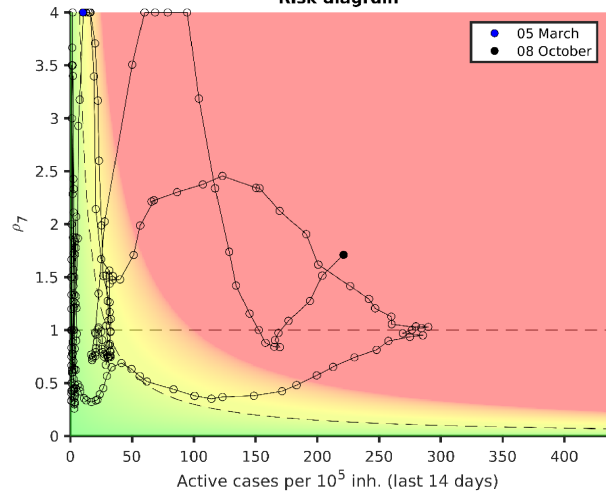
BIOCOM-Cov2 Degree = 9



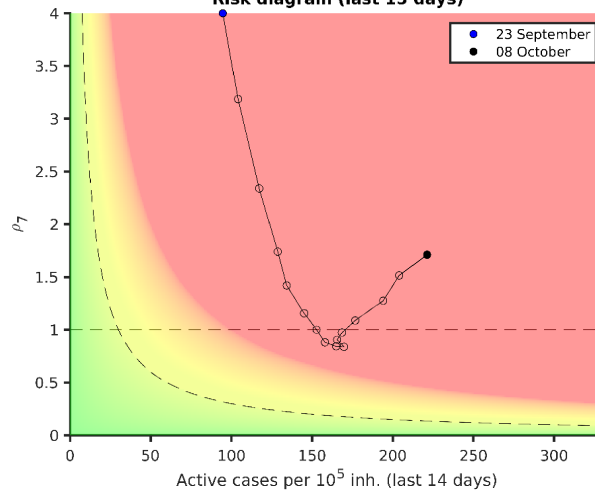
Actual $\rho_7 = 1.7$



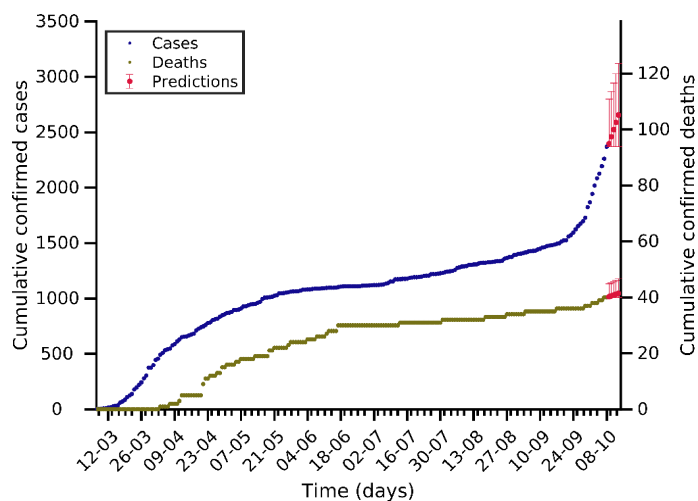
Risk diagram



Risk diagram (last 15 days)



Latvia 08-10-2020. Pop: 1.9M. Cumulative incidence: 126/10⁵

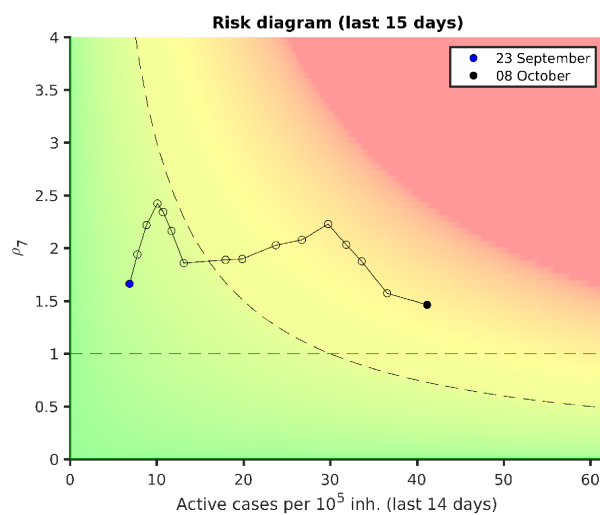
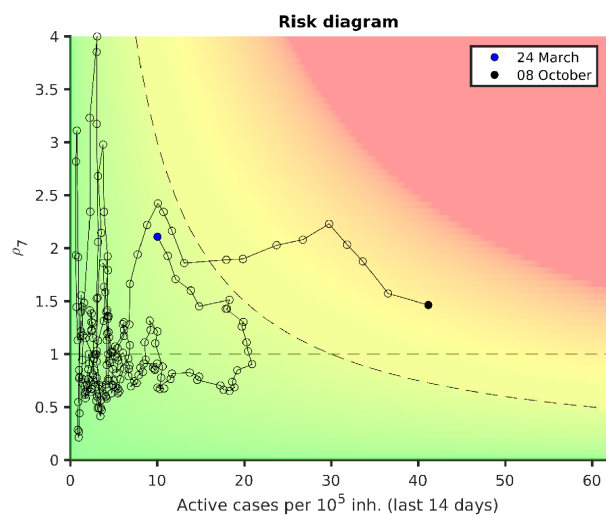
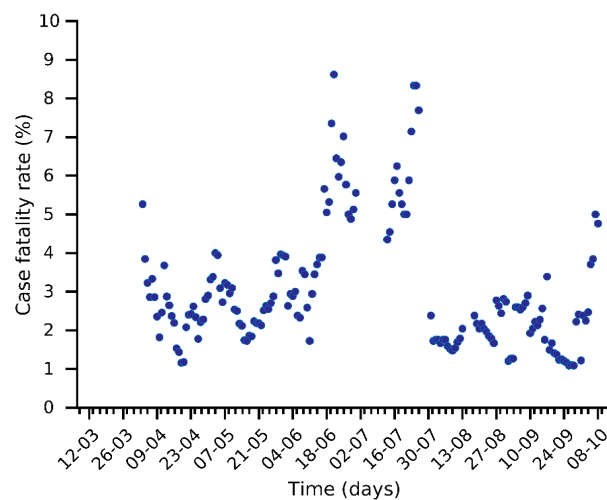
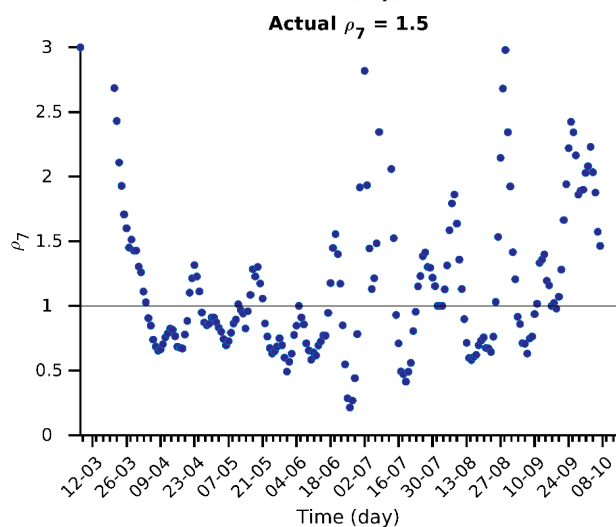
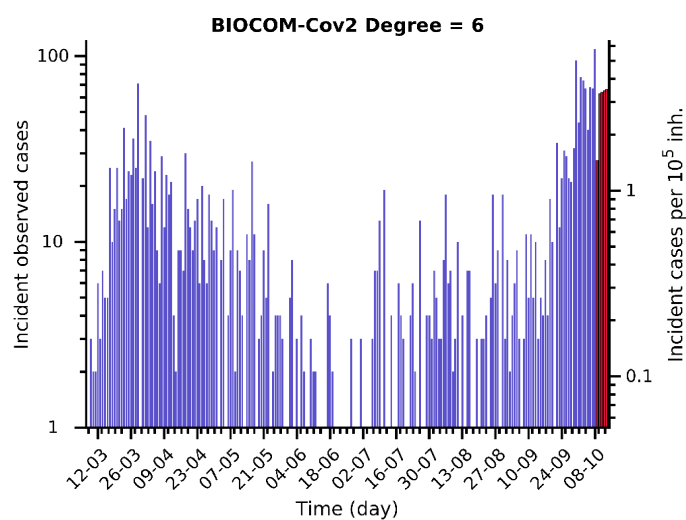
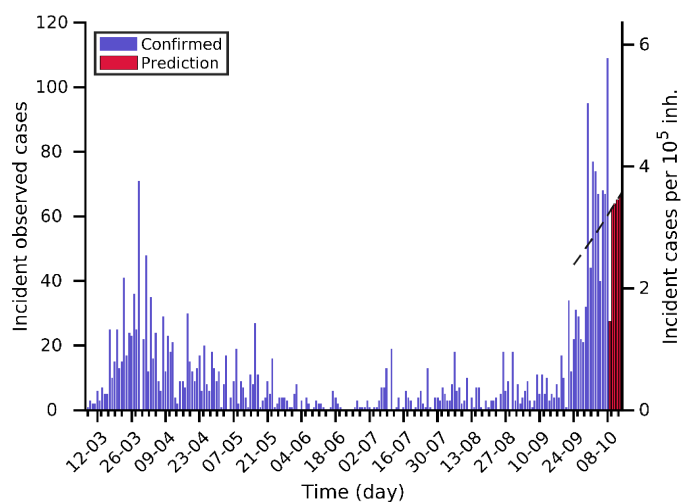


Predictions for next days

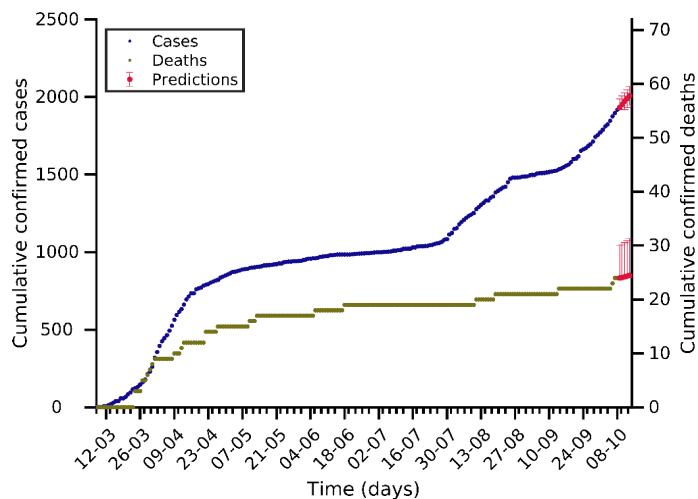
Day	Number of cases	95% Confidence Interval
09-10-2020	2397 (+27)	[2370 - 2798]
11-10-2020	2524 (+64)	[2370 - 2945]
13-10-2020	2656 (+66)	[2370 - 3122]

Current indicators

A ₁₄	EPG	CFR
41	60	4.76 %



Cyprus 08-10-2020. Pop: 1.2M. Cumulative incidence: 159/10⁵

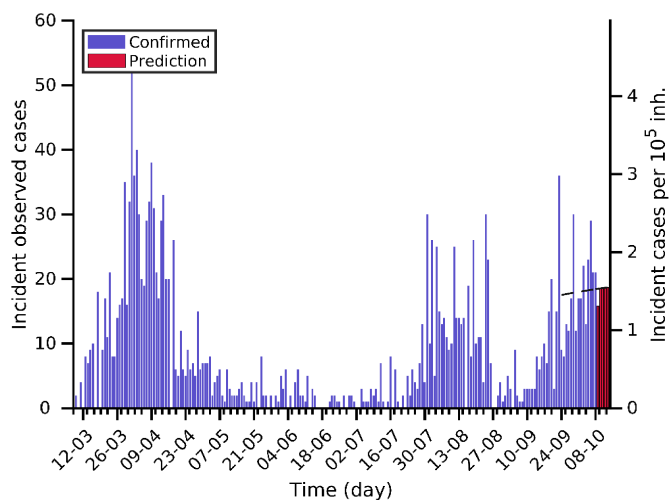


Predictions for next days

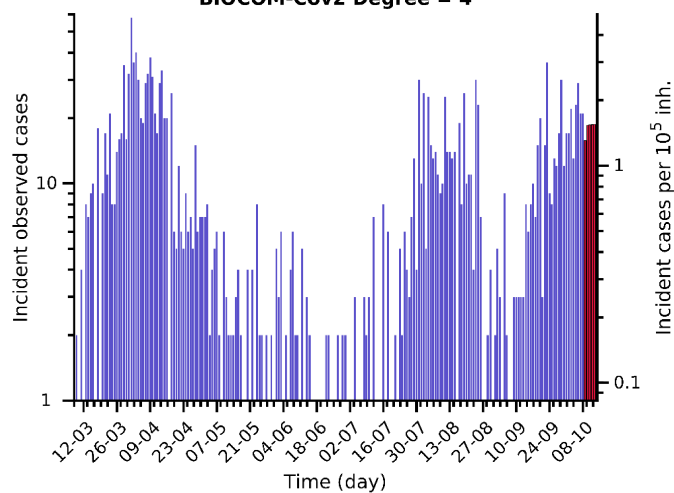
Day	Number of cases	95% Confidence Interval
09-10-2020	1934 (+16)	[1918 - 1987]
11-10-2020	1971 (+19)	[1918 - 2026]
13-10-2020	2008 (+19)	[1948 - 2068]

Current indicators

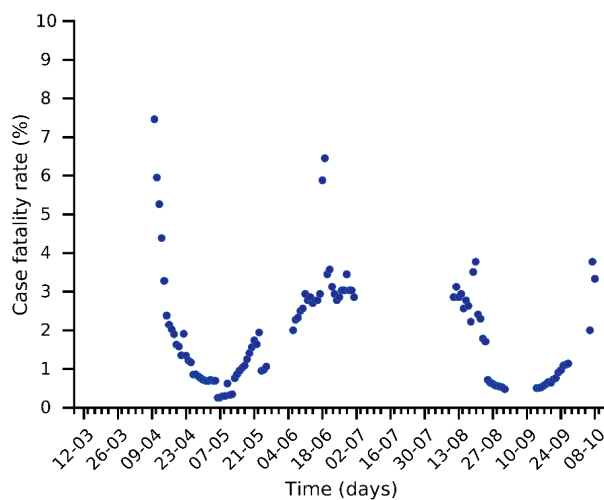
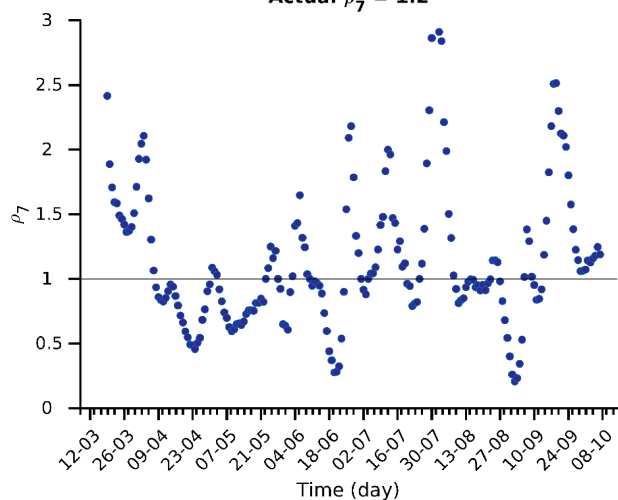
A ₁₄	EPG	CFR
21	25	3.33 %



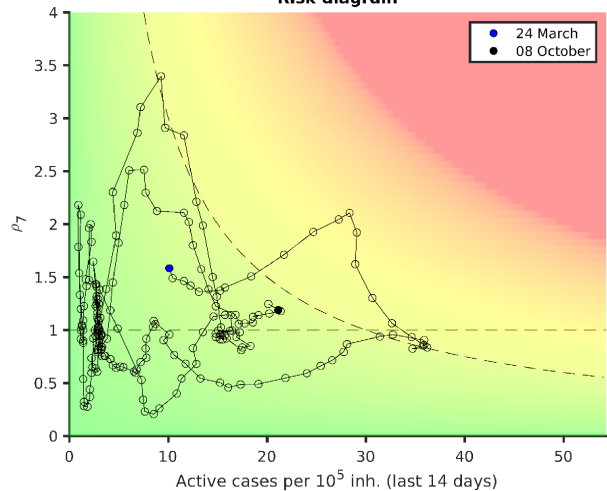
BIOCOM-Cov2 Degree = 4



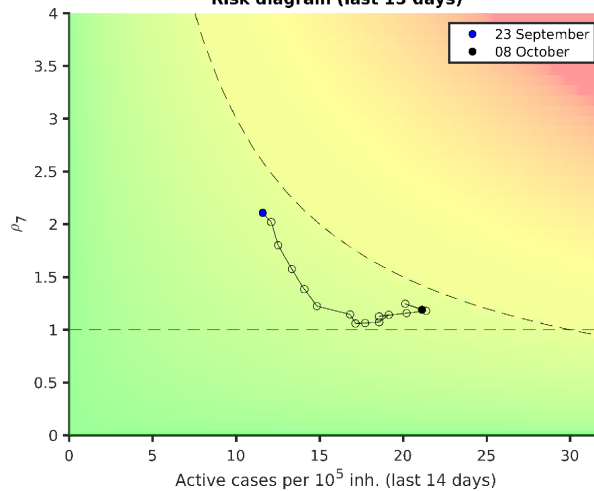
Actual $\rho_7 = 1.2$



Risk diagram

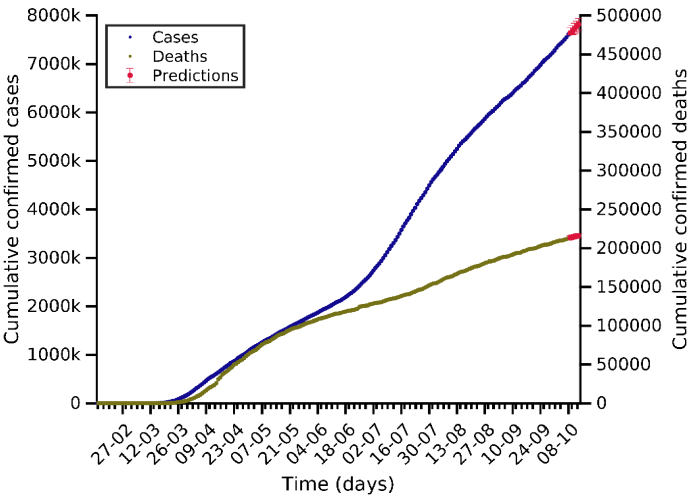


Risk diagram (last 15 days)



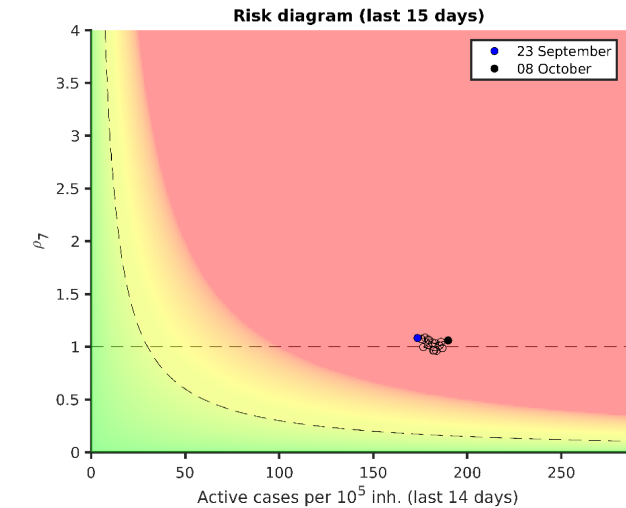
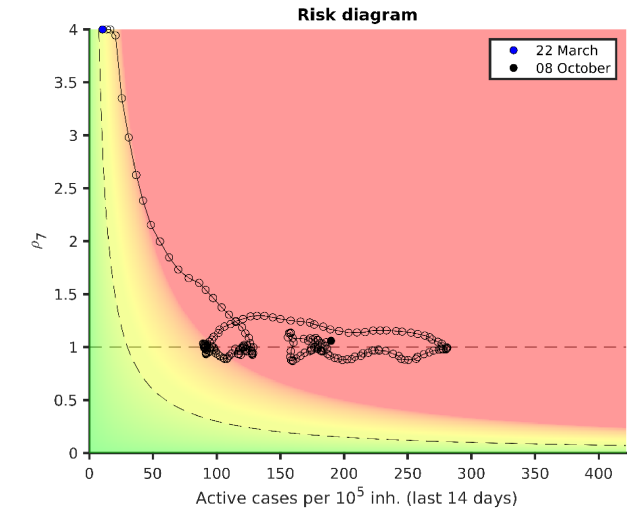
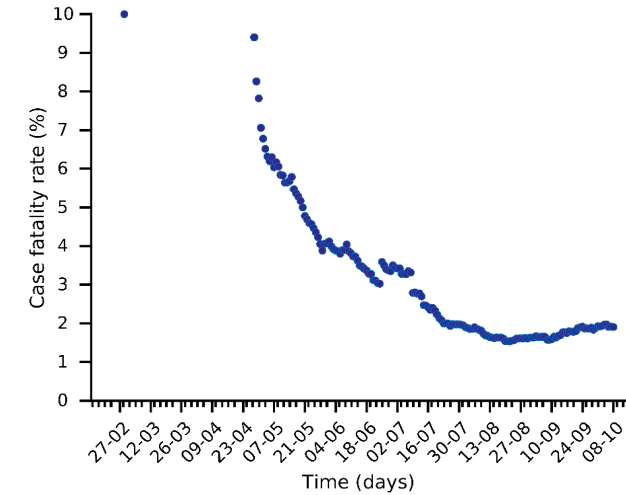
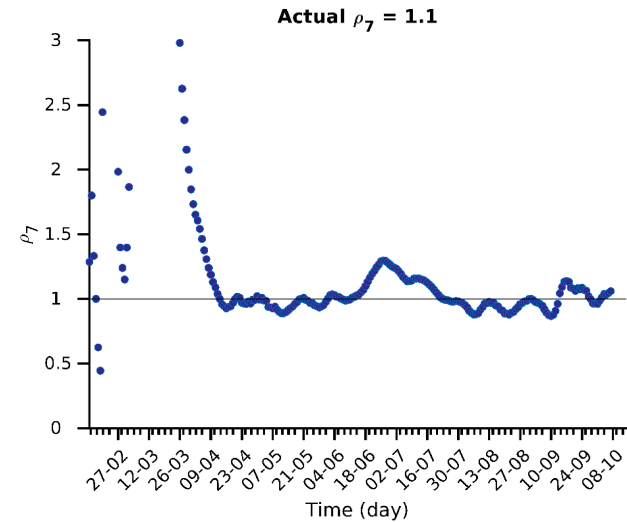
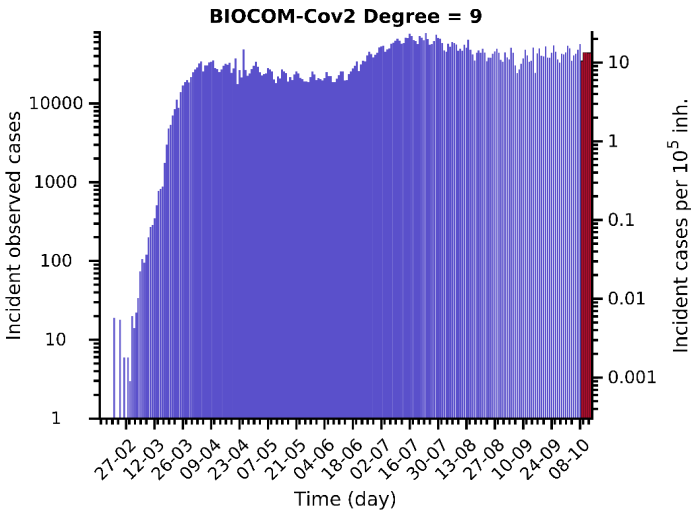
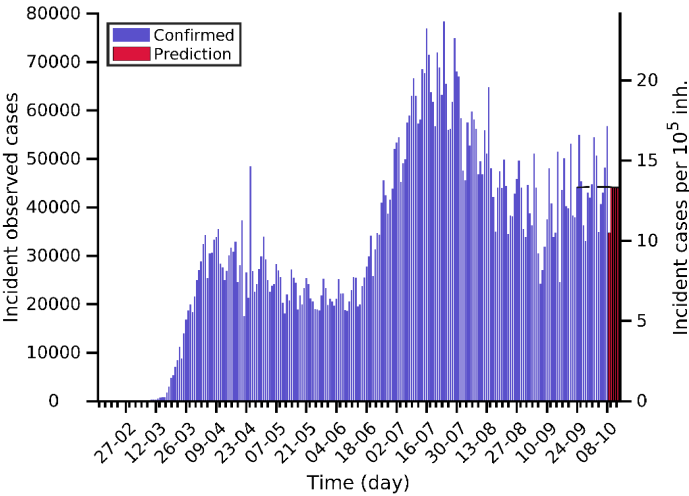
(2) Analysis and prediction of COVID-19 for other countries

USA 08-10-2020. Pop: 331.0M. Cumulative incidence: 2298/10⁵

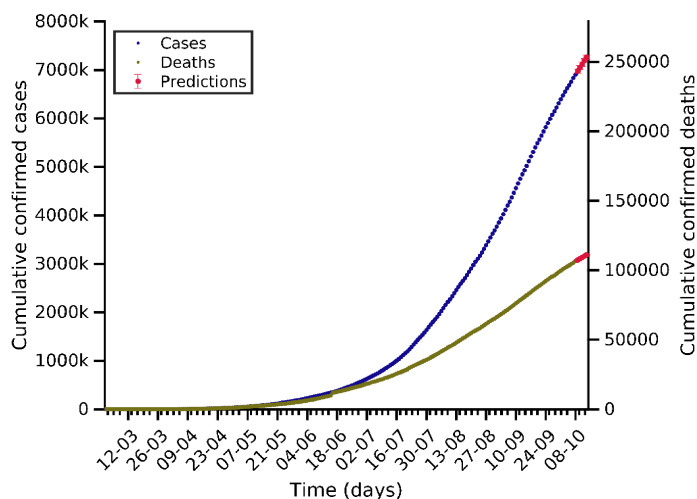


Predictions for next days		
Day	Number of cases	95% Confidence Interval
09-10-2020	7641383 (+34789)	[7606594 - 7747304]
11-10-2020	7729733 (+44169)	[7619643 - 7839823]
13-10-2020	7818032 (+44143)	[7699022 - 7937043]

Current indicators		
A ₁₄	EPG	CFR
190	201	1.90 %



India 08-10-2020. Pop: 1353.0M. Cumulative incidence: 510/10⁵

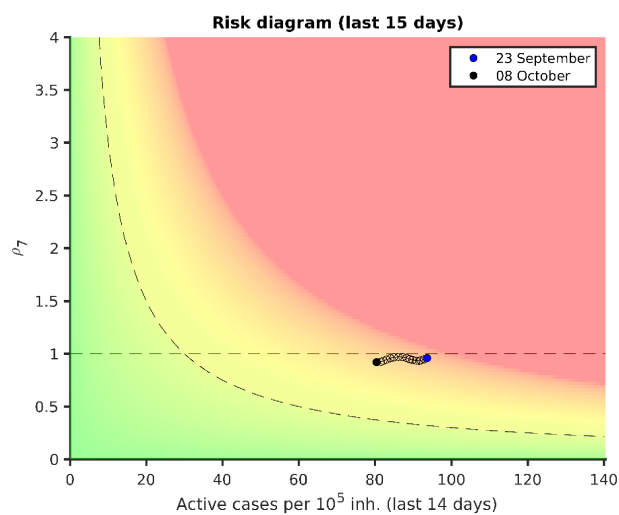
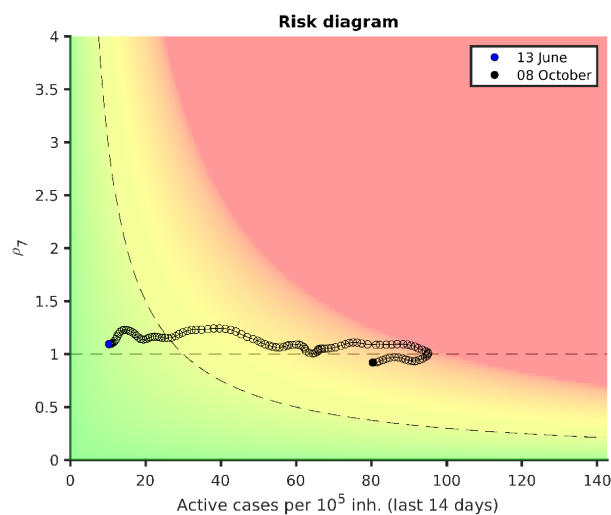
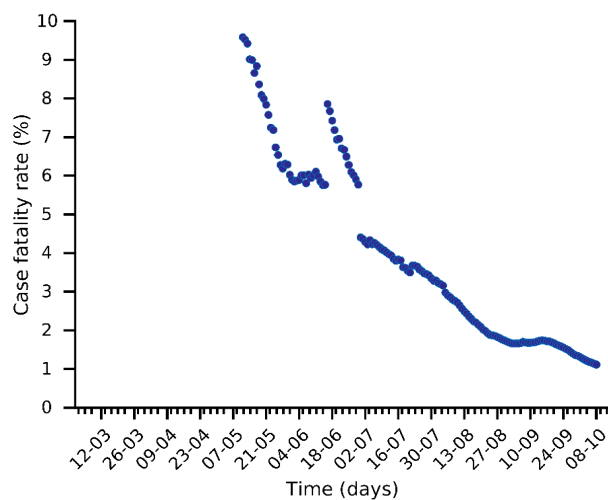
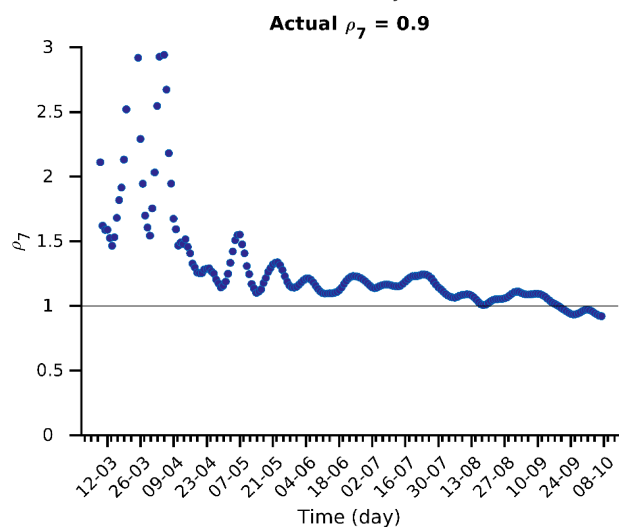
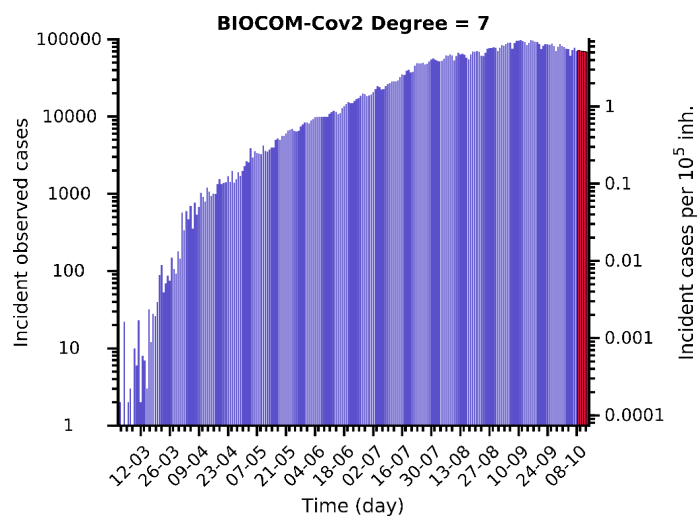
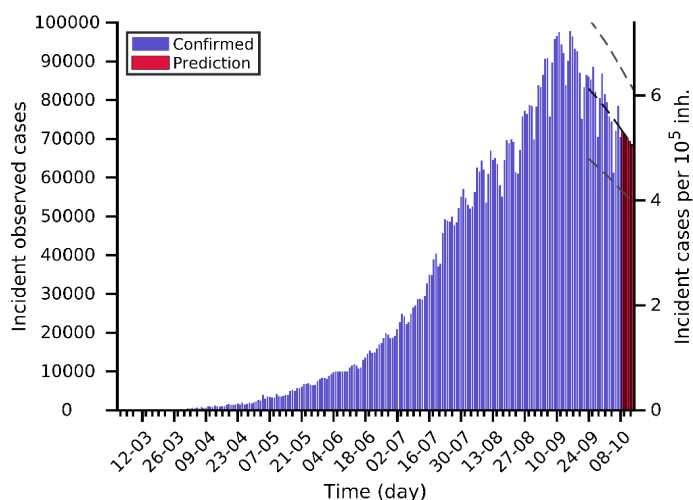


Predictions for next days

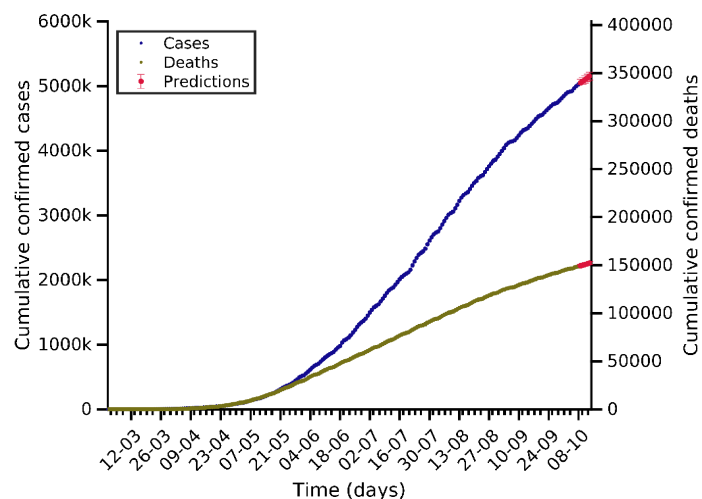
Day	Number of cases	95% Confidence Interval
09-10-2020	6978095 (+71944)	[6936381 - 7019809]
11-10-2020	7119421 (+70248)	[7076168 - 7162674]
13-10-2020	7257409 (+68575)	[7210960 - 7303859]

Current indicators

A ₁₄	EPG	CFR
80	74	1.11 %



Brazil 08-10-2020. Pop: 212.6M. Cumulative incidence: 2366/10⁵

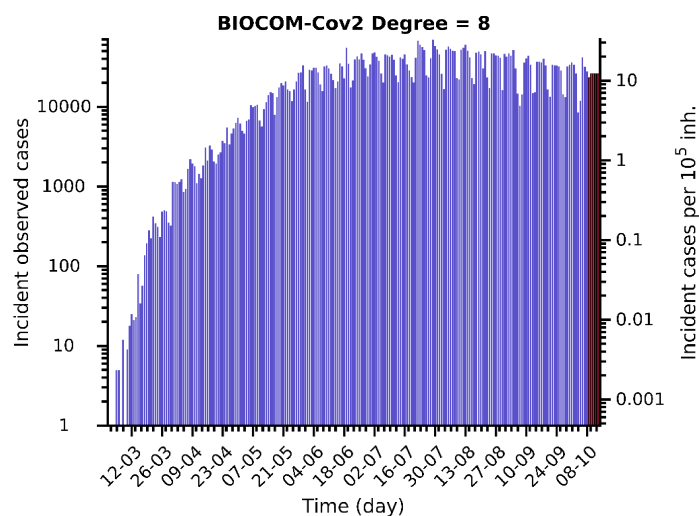
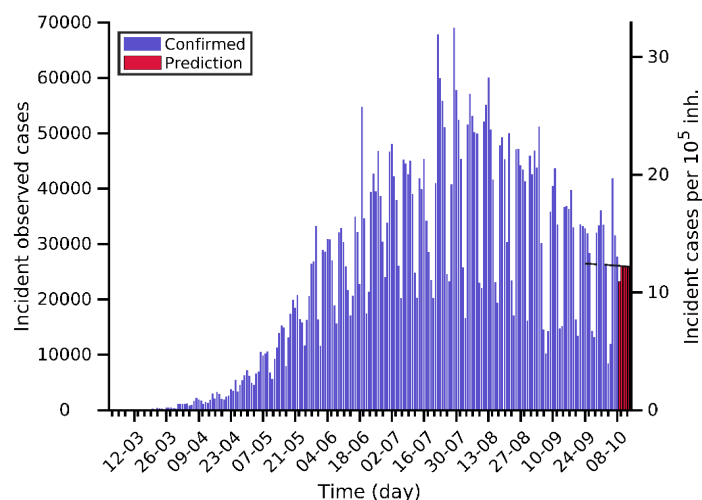


Predictions for next days

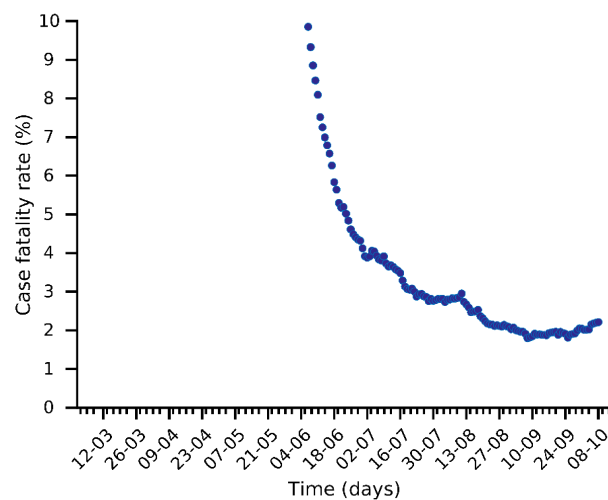
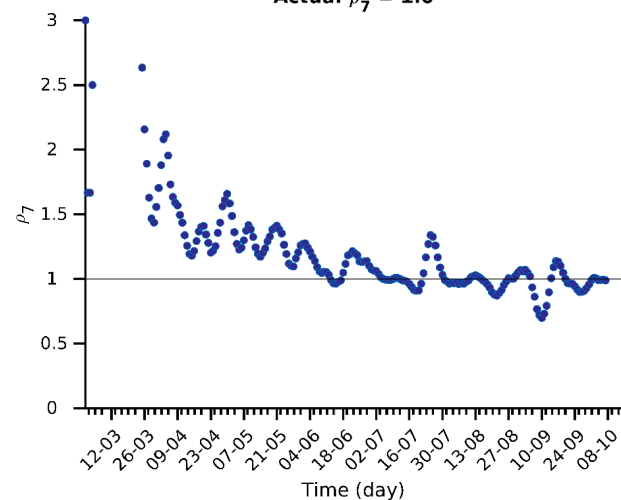
Day	Number of cases	95% Confidence Interval
09-10-2020	5051656 (+23212)	[5028444 - 5105763]
11-10-2020	5103656 (+25982)	[5047443 - 5159869]
13-10-2020	5155511 (+25909)	[5094811 - 5216211]

Current indicators

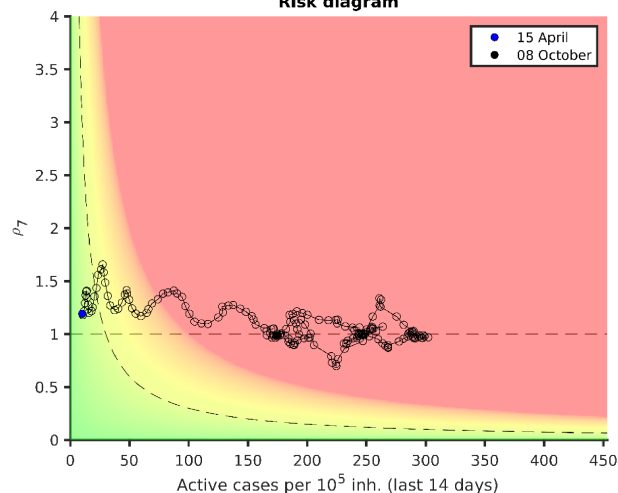
A ₁₄	EPG	CFR
174	172	2.21 %



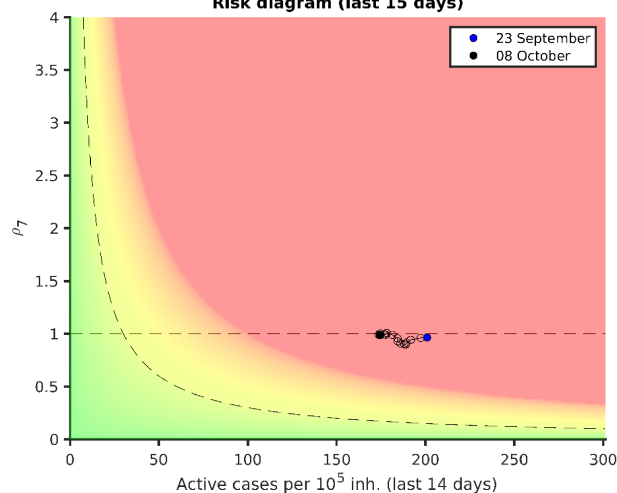
Actual $\rho_7 = 1.0$



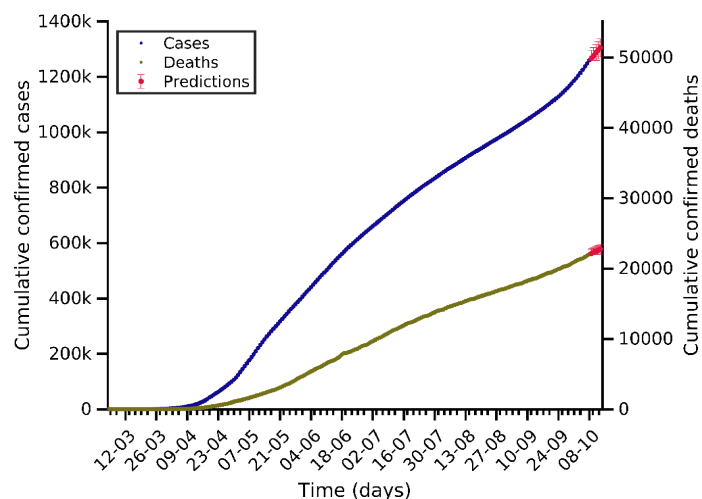
Risk diagram



Risk diagram (last 15 days)



Russia 08-10-2020. Pop: 145.9M. Cumulative incidence: 863/10⁵

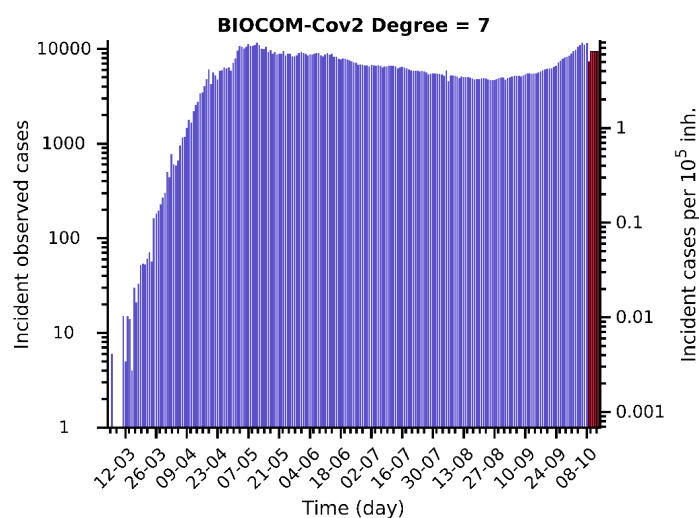
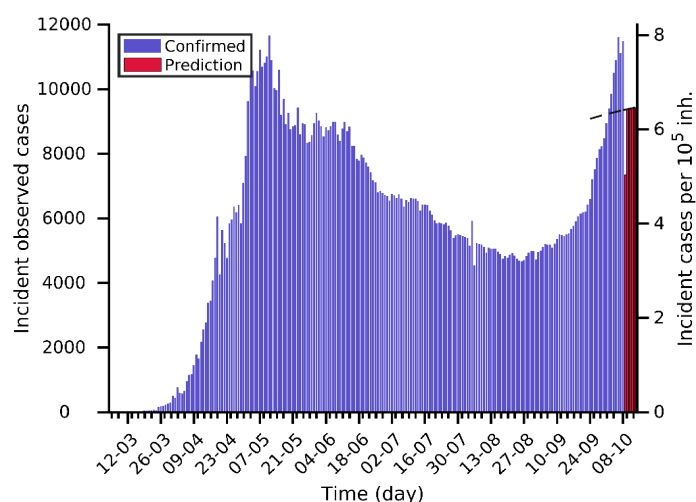


Predictions for next days

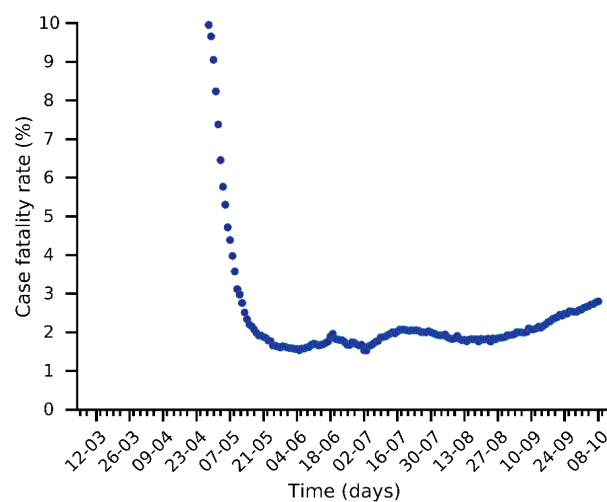
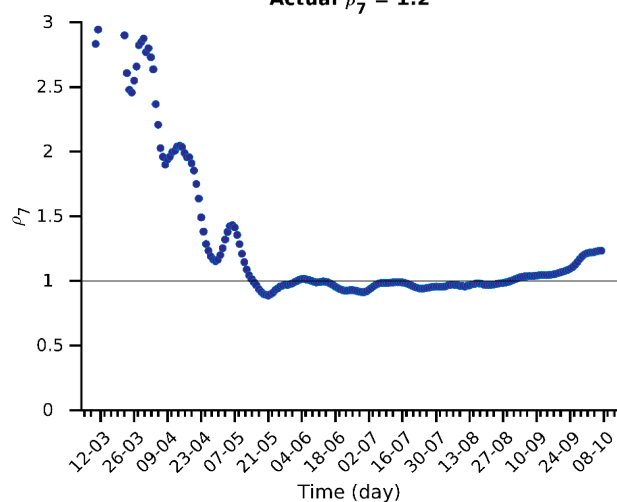
Day	Number of cases	95% Confidence Interval
09-10-2020	1267455 (+7343)	[1260112 - 1296267]
11-10-2020	1286241 (+9401)	[1260112 - 1316211]
13-10-2020	1305089 (+9432)	[1272620 - 1337558]

Current indicators

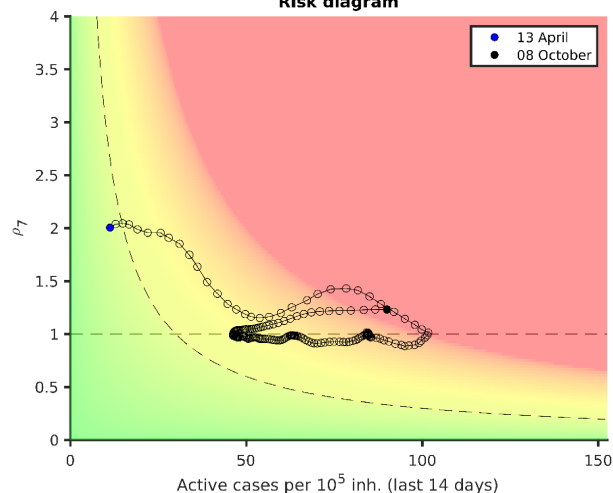
A ₁₄	EPG	CFR
90	111	2.80 %



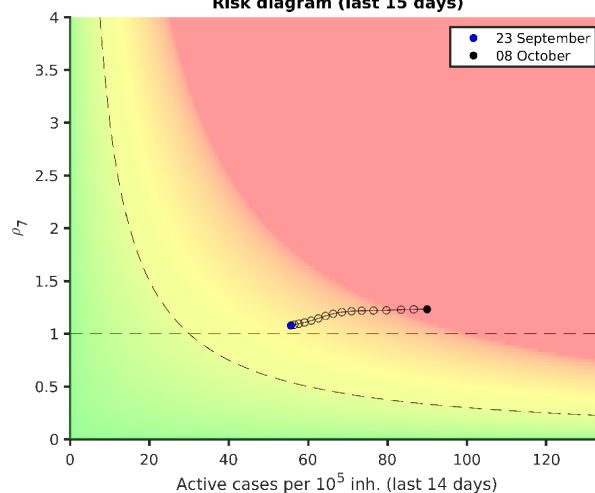
Actual $\rho_7 = 1.2$



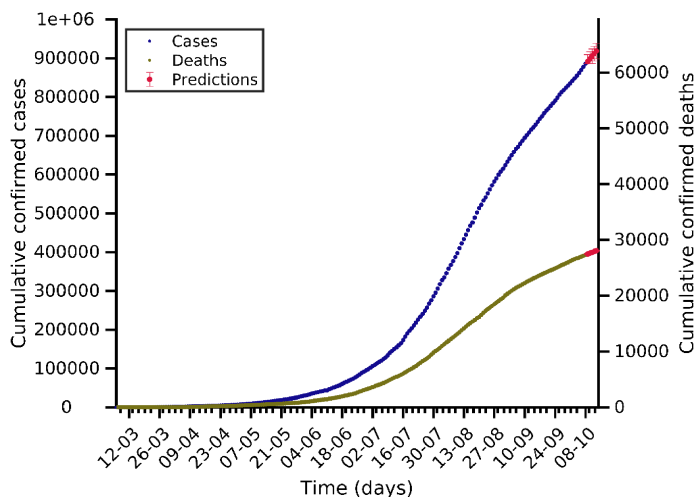
Risk diagram



Risk diagram (last 15 days)



Colombia 08-10-2020. Pop: 50.9M. Cumulative incidence: 1742/10⁵

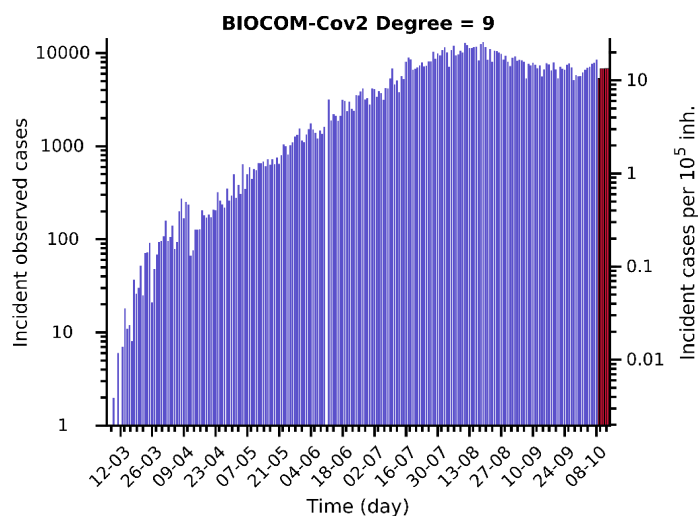
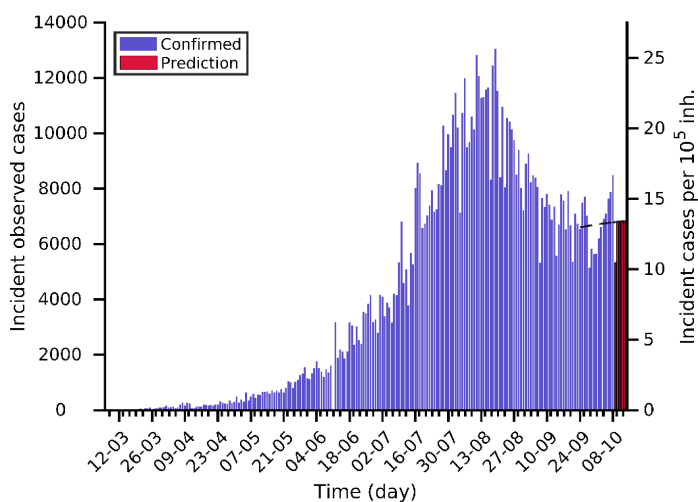


Predictions for next days

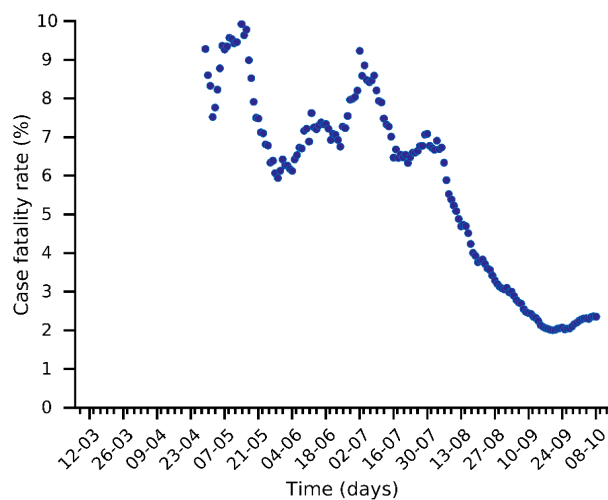
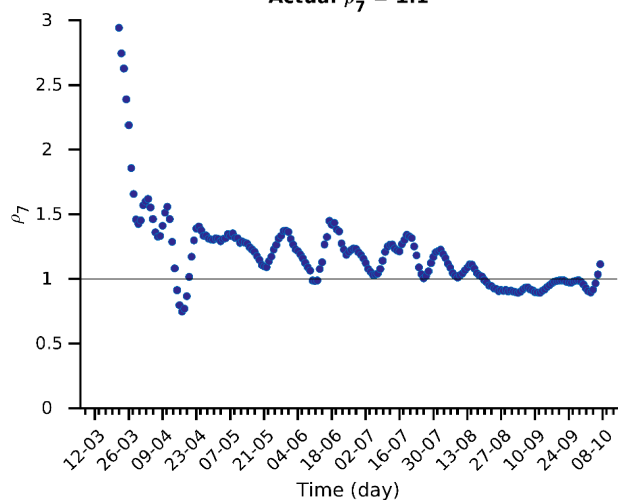
Day	Number of cases	95% Confidence Interval
09-10-2020	891506 (+5327)	[886179 - 909349]
11-10-2020	905122 (+6813)	[886563 - 923682]
13-10-2020	918776 (+6831)	[898672 - 938880]

Current indicators

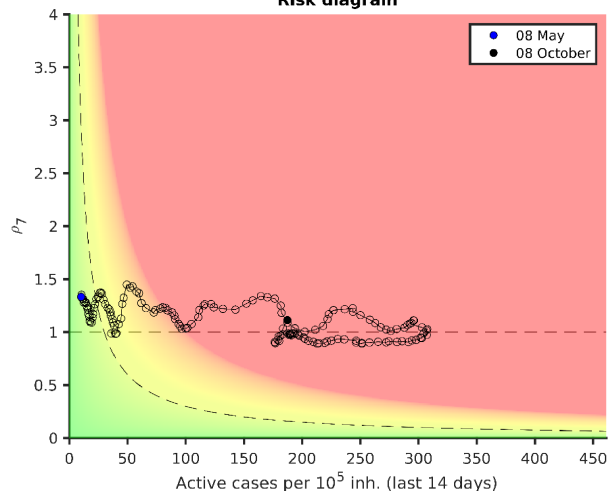
A ₁₄	EPG	CFR
187	209	2.35 %



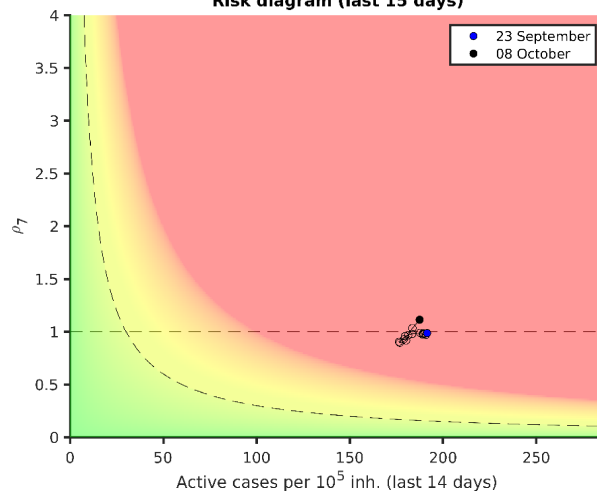
Actual $\rho_7 = 1.1$



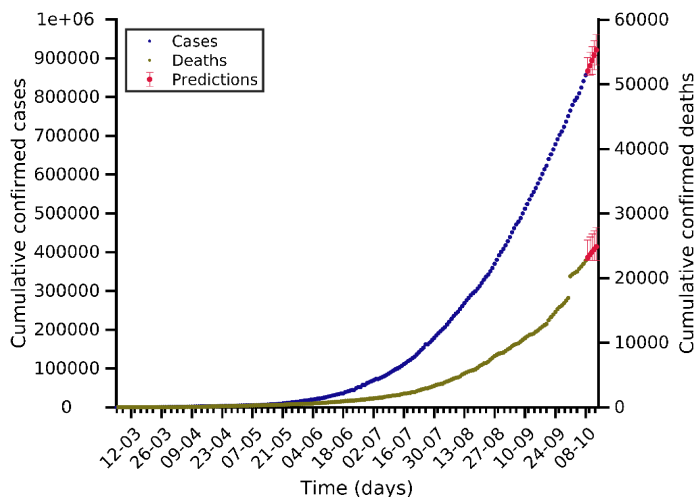
Risk diagram



Risk diagram (last 15 days)



Argentina 08-10-2020. Pop: 45.2M. Cumulative incidence: 1895/10⁵

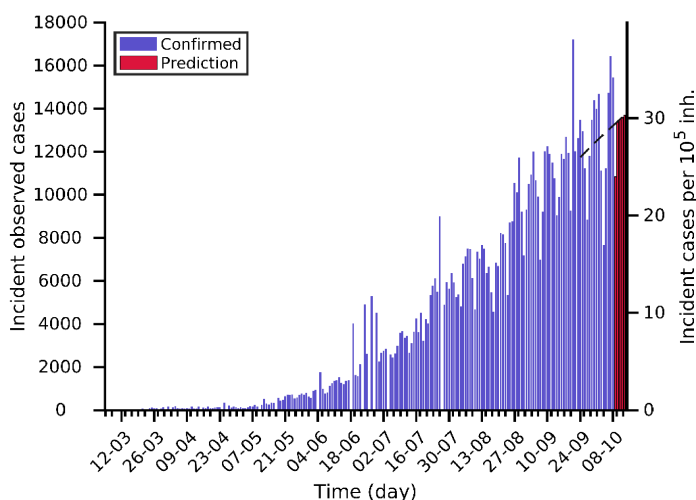


Predictions for next days

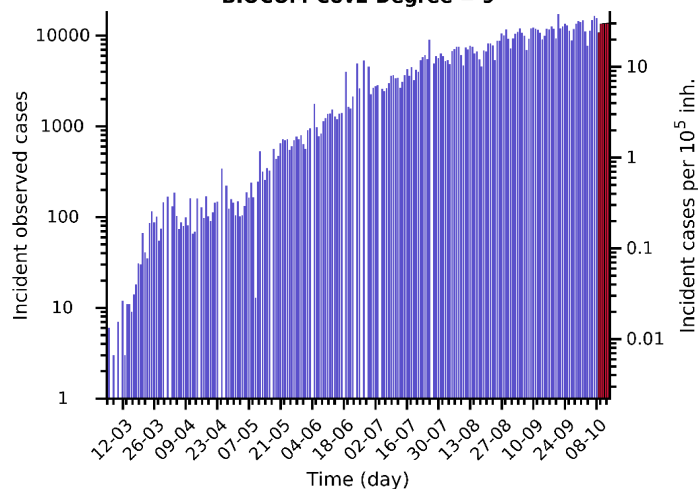
Day	Number of cases	95% Confidence Interval
09-10-2020	867198 (+10842)	[856356 - 901617]
11-10-2020	894107 (+13503)	[858199 - 930014]
13-10-2020	921397 (+13692)	[882189 - 960605]

Current indicators

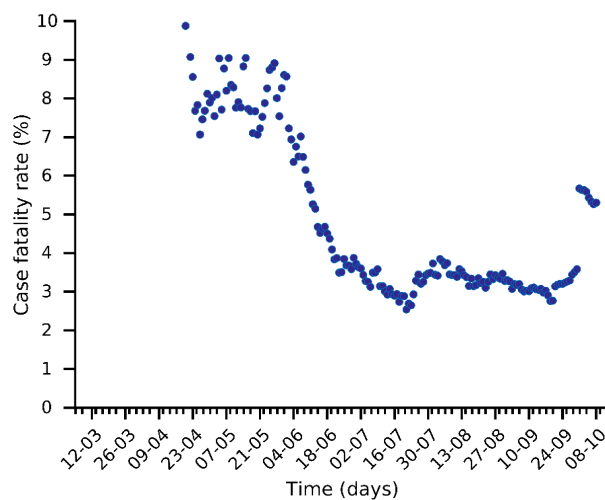
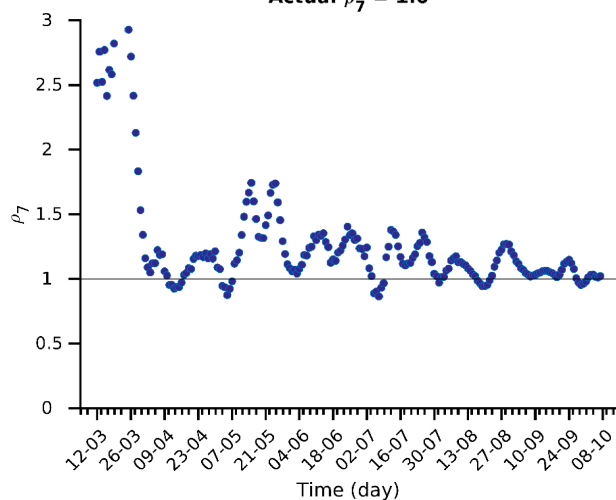
A ₁₄	EPG	CFR
394	402	5.30 %



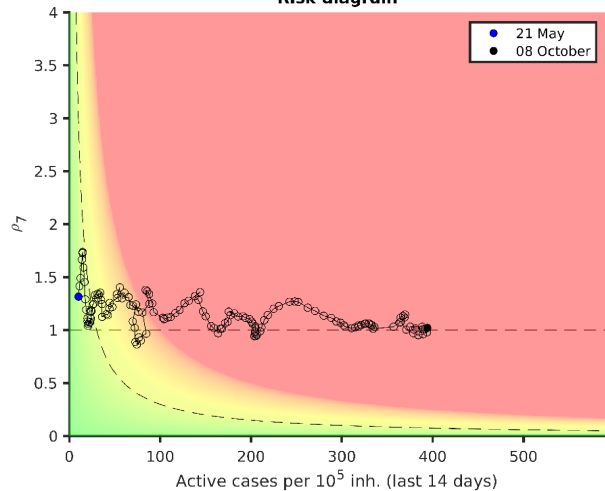
BIOCOM-Cov2 Degree = 9



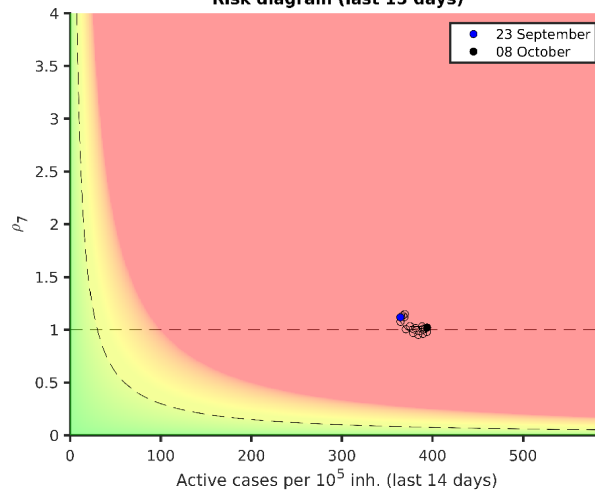
Actual $\rho_7 = 1.0$



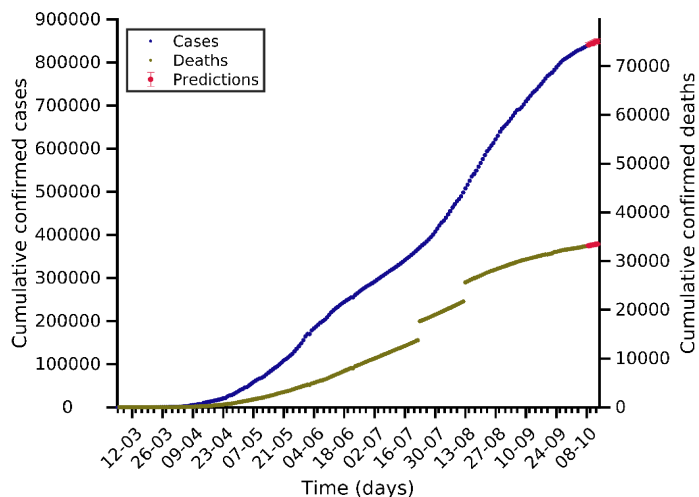
Risk diagram



Risk diagram (last 15 days)



Peru 08-10-2020. Pop: 33.0M. Cumulative incidence: 2543/10⁵

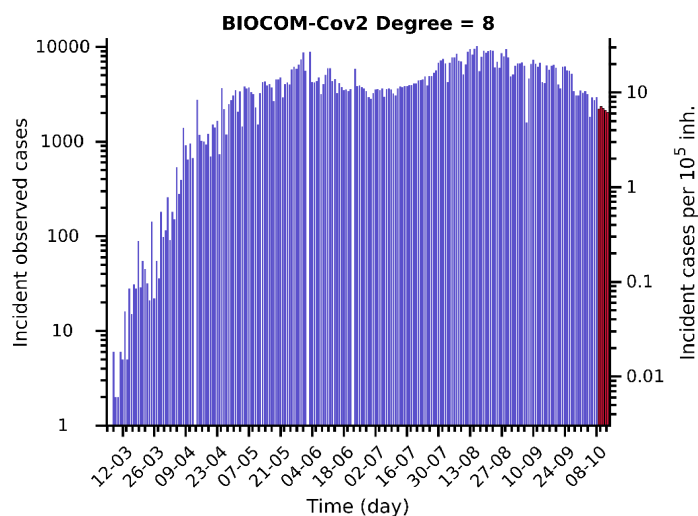
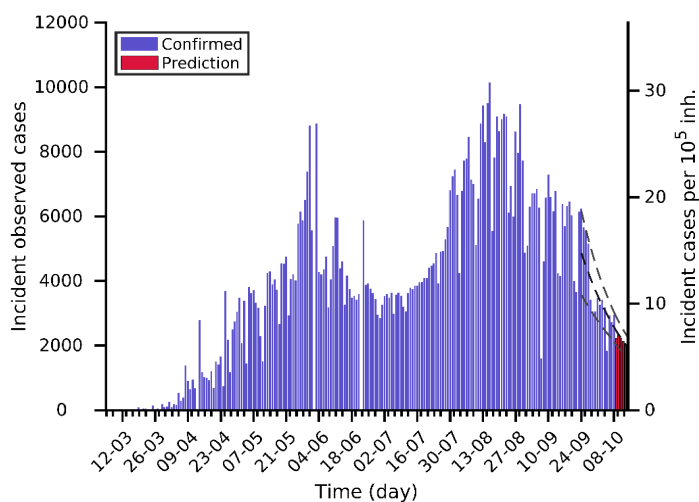


Predictions for next days

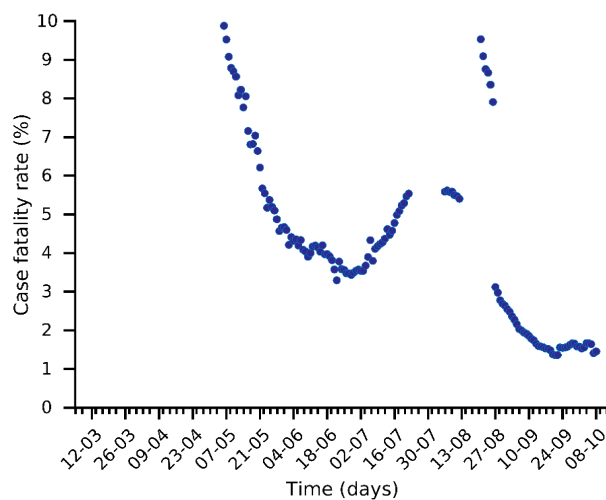
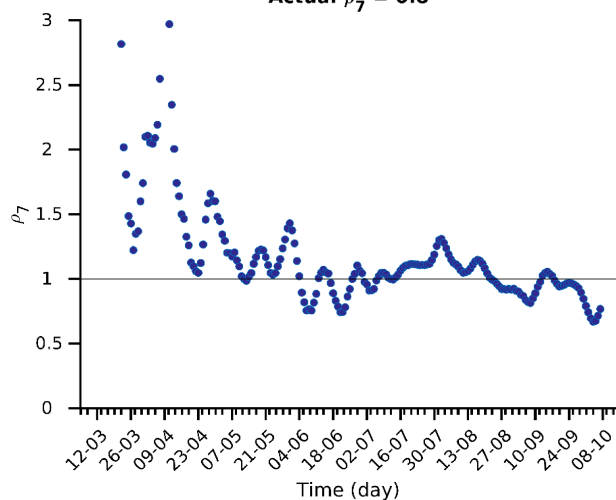
Day	Number of cases	95% Confidence Interval
09-10-2020	840830 (+2216)	[838614 - 845862]
11-10-2020	845406 (+2234)	[840238 - 850574]
13-10-2020	849568 (+2032)	[844151 - 854985]

Current indicators

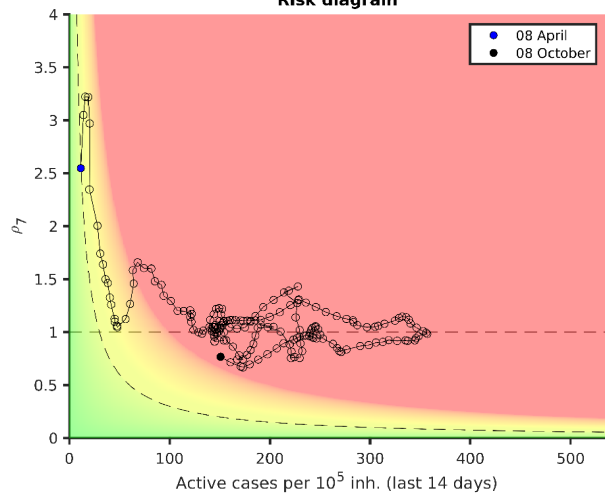
A ₁₄	EPG	CFR
151	116	1.45 %



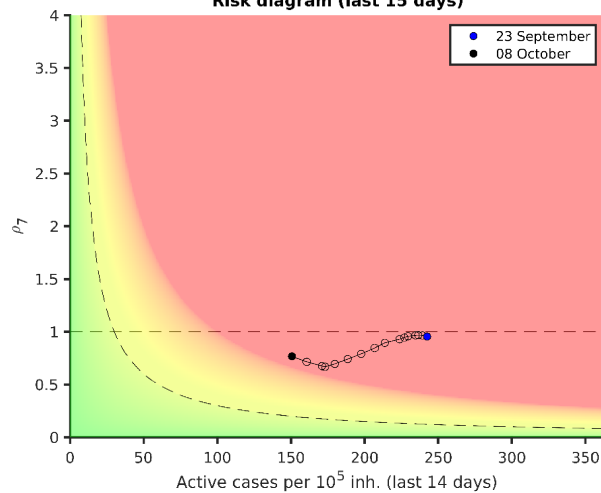
Actual $\rho_7 = 0.8$



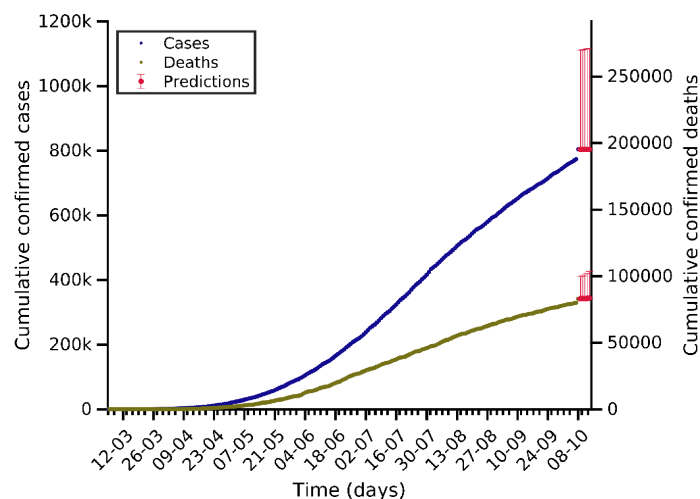
Risk diagram



Risk diagram (last 15 days)



Mexico 08-10-2020. Pop: 128.9M. Cumulative incidence: 624/10⁵

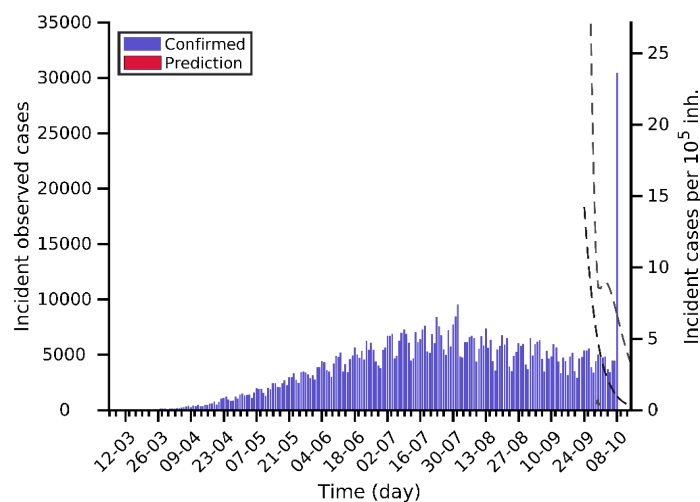


Predictions for next days

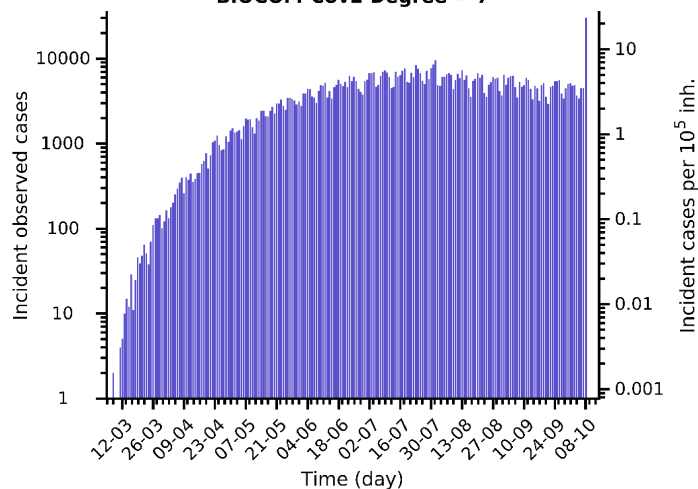
Day	Number of cases	95% Confidence Interval
09-10-2020	804488 (+0)	[804488 - 1110630]
11-10-2020	804488 (+0)	[804488 - 1114083]
13-10-2020	804488 (+0)	[804488 - 1117317]

Current indicators

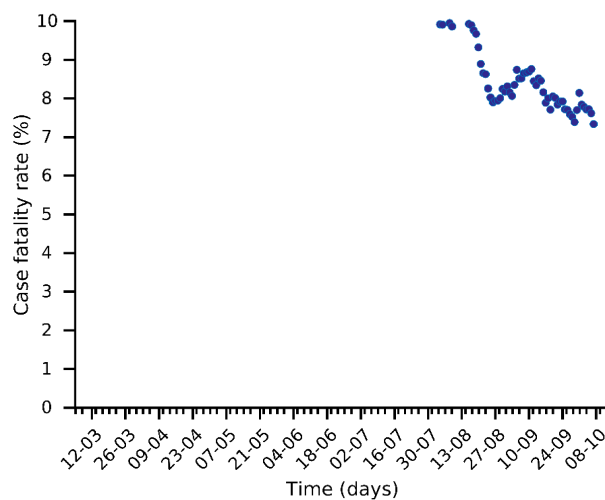
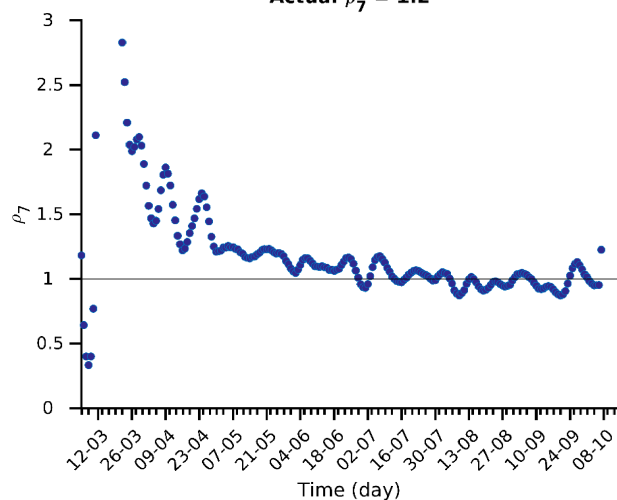
A ₁₄	EPG	CFR
69	85	10.00 %



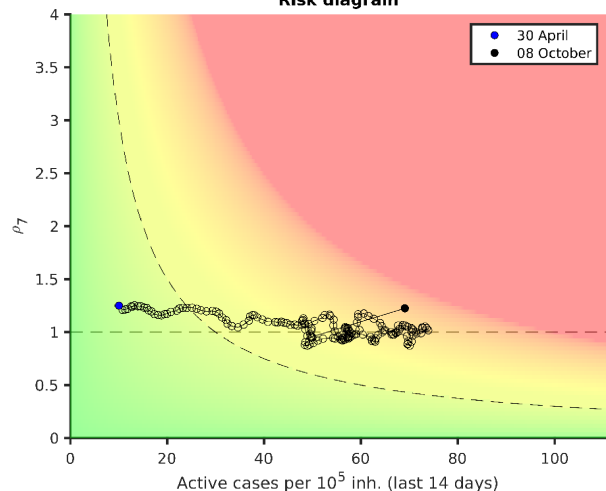
BIOCOM-Cov2 Degree = 7



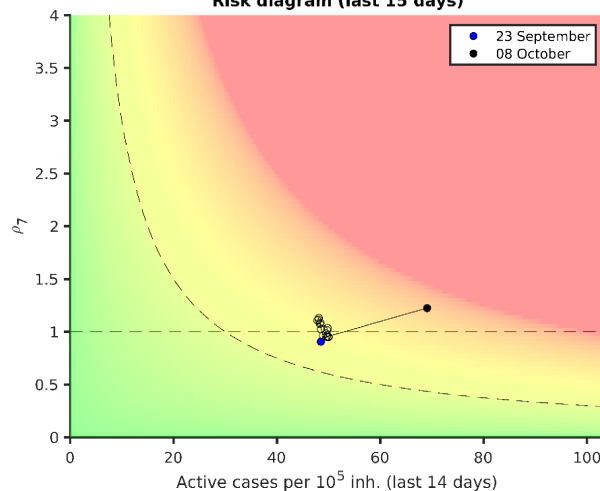
Actual $\rho_7 = 1.2$



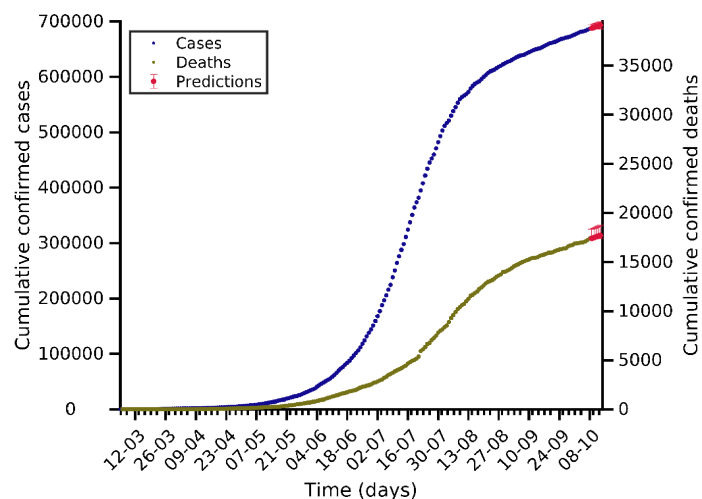
Risk diagram



Risk diagram (last 15 days)



South Africa 08-10-2020. Pop: 59.3M. Cumulative incidence: 1158/10⁵

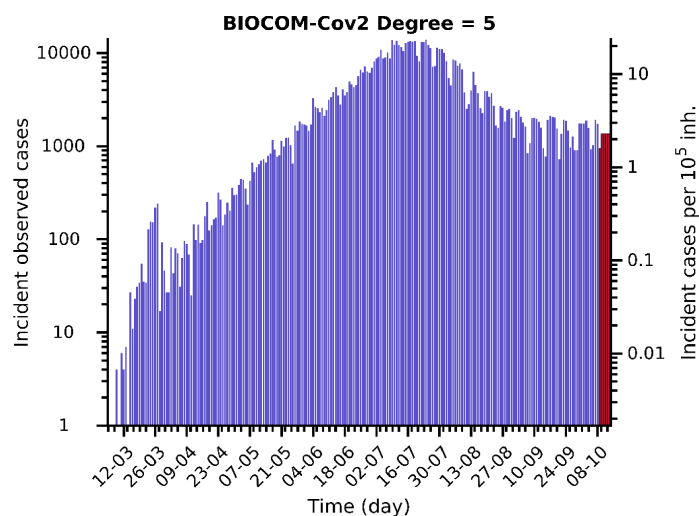
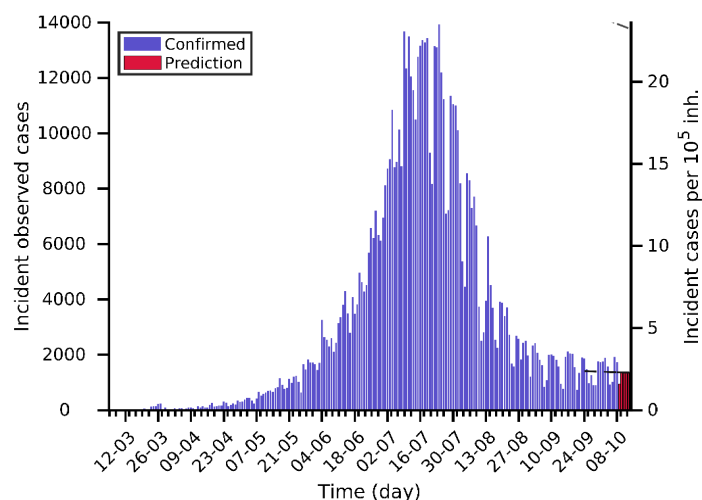


Predictions for next days

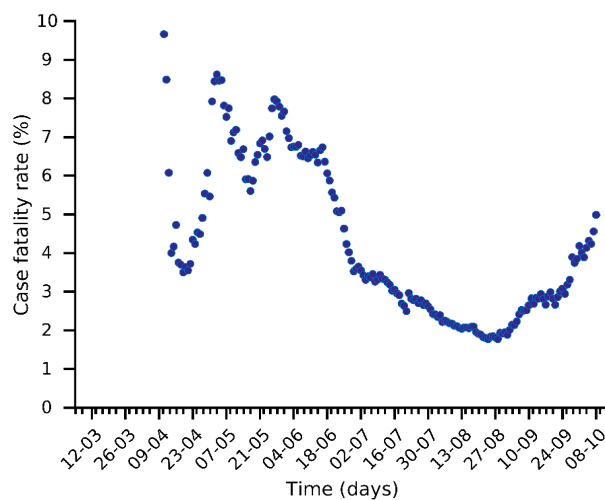
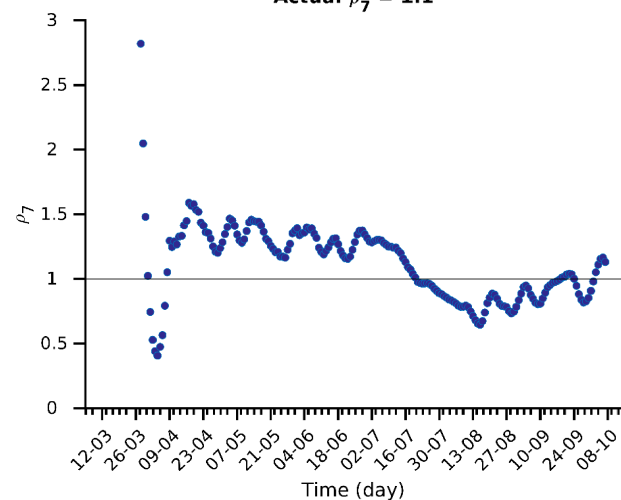
Day	Number of cases	95% Confidence Interval
09-10-2020	687841 (+950)	[686891 - 693668]
11-10-2020	690562 (+1359)	[686891 - 696611]
13-10-2020	693271 (+1353)	[686891 - 699790]

Current indicators

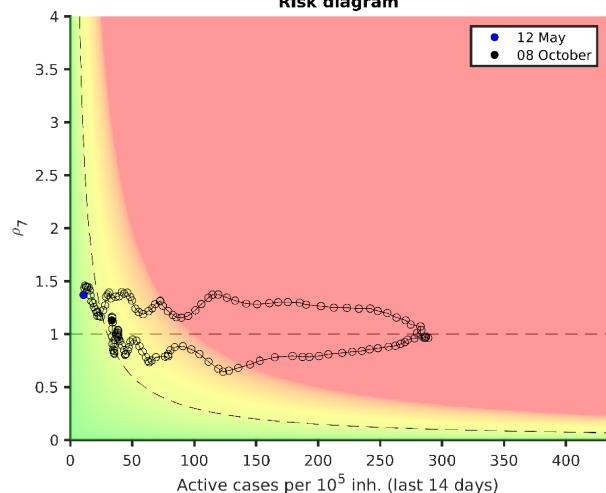
A ₁₄	EPG	CFR
33	38	4.99 %



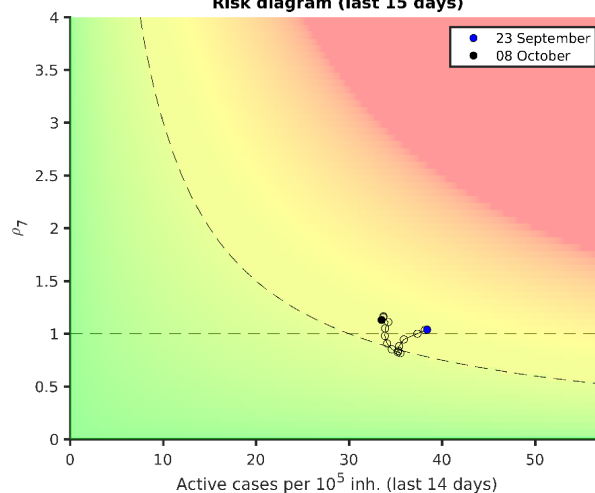
Actual $\rho_7 = 1.1$



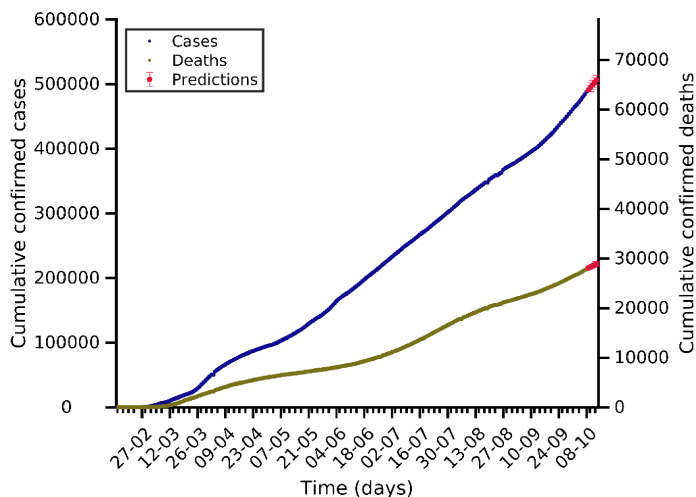
Risk diagram



Risk diagram (last 15 days)



Iran 08-10-2020. Pop: 84.0M. Cumulative incidence: 581/10⁵

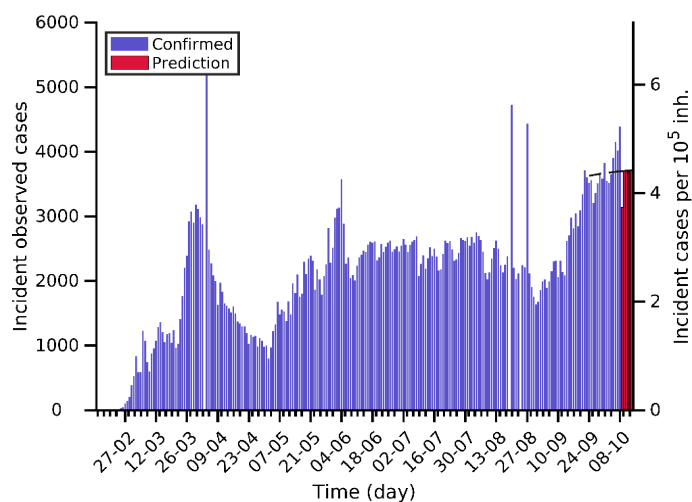


Predictions for next days

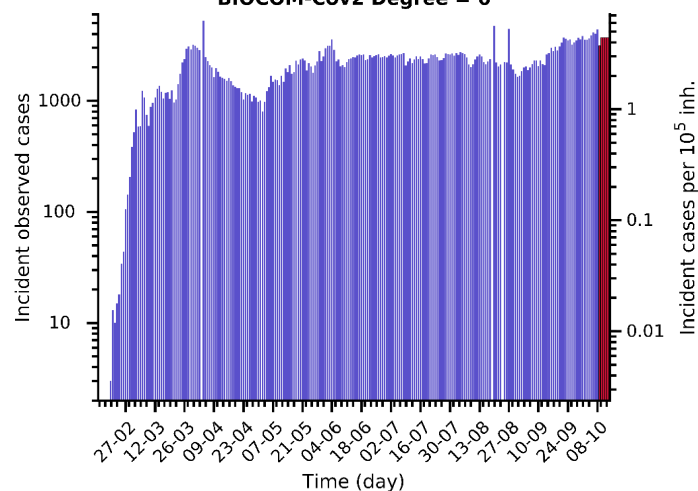
Day	Number of cases	95% Confidence Interval
09-10-2020	491373 (+3137)	[488236 - 498071]
11-10-2020	498785 (+3708)	[491820 - 505750]
13-10-2020	506210 (+3714)	[498668 - 513751]

Current indicators

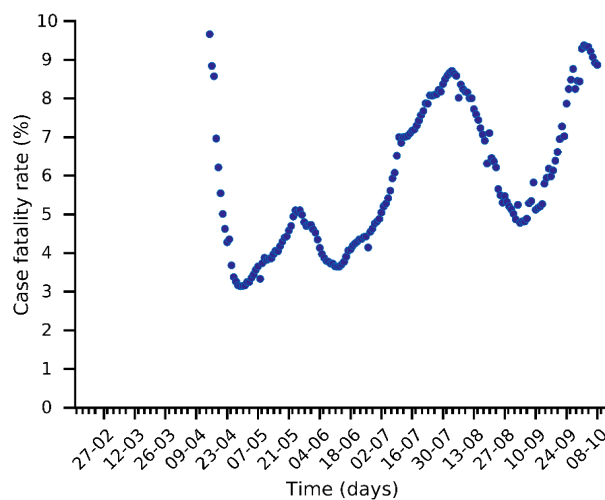
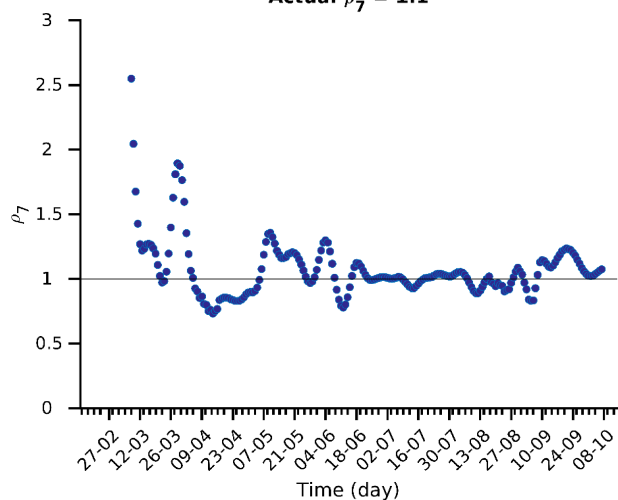
A ₁₄	EPG	CFR
62	66	8.87 %



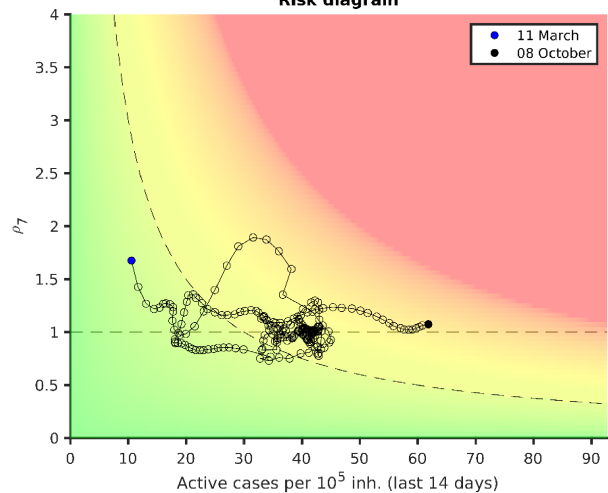
BIOCOM-Cov2 Degree = 6



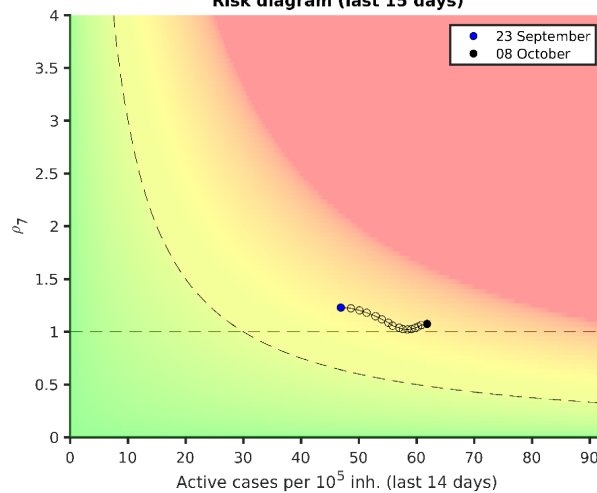
Actual $\rho_7 = 1.1$



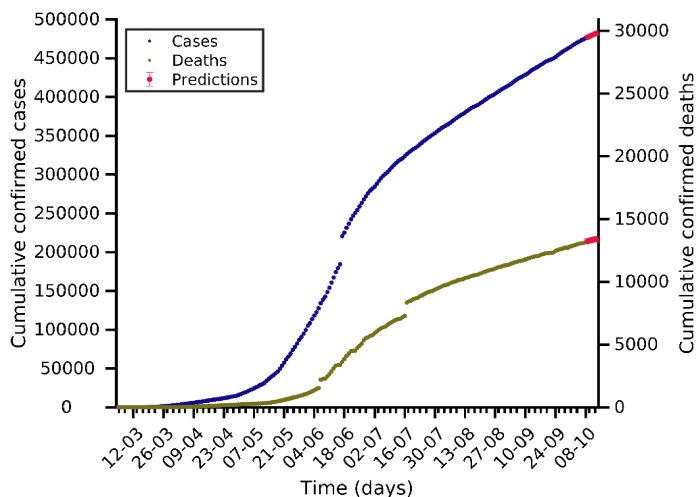
Risk diagram



Risk diagram (last 15 days)



Chile 08-10-2020. Pop: 19.1M. Cumulative incidence: 2490/10⁵

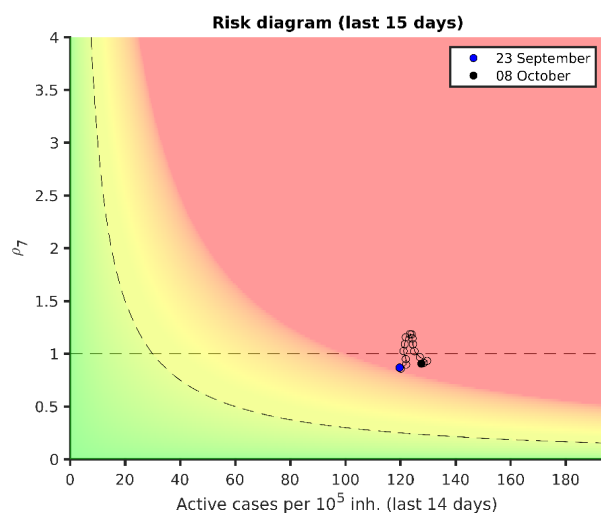
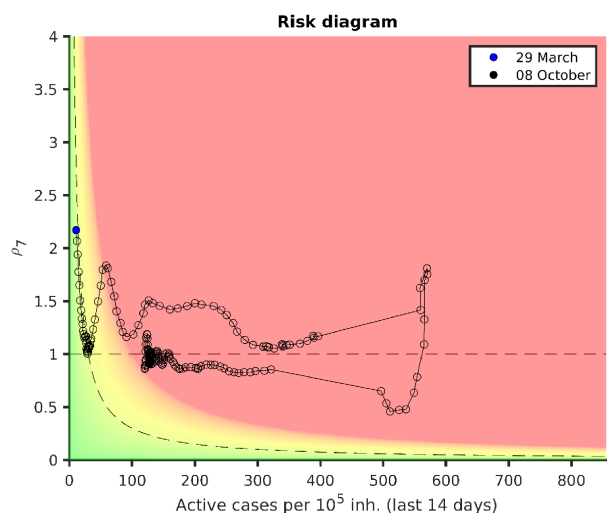
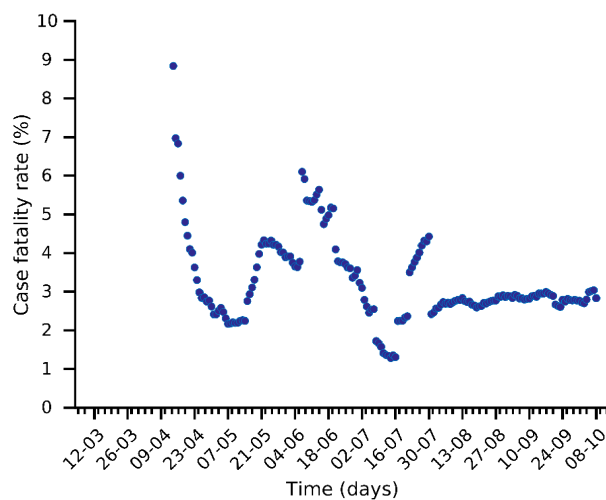
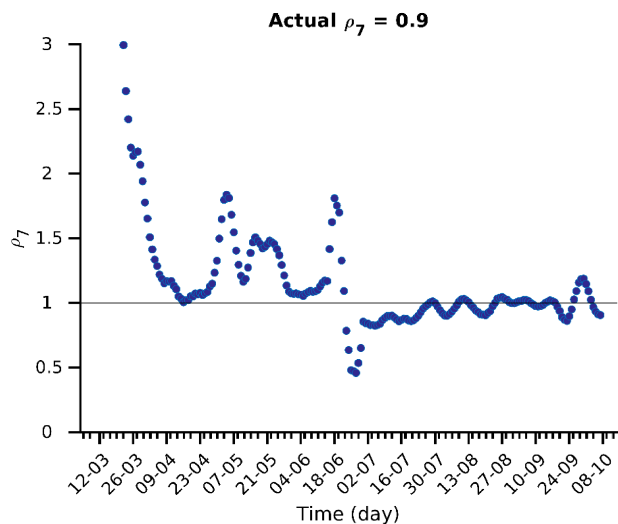
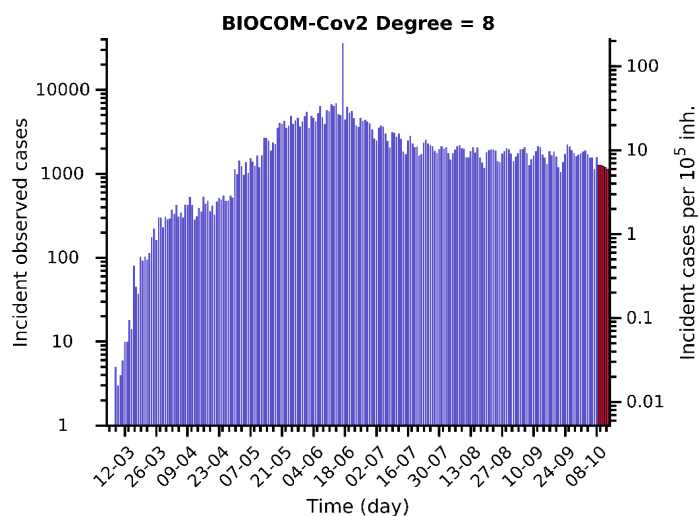
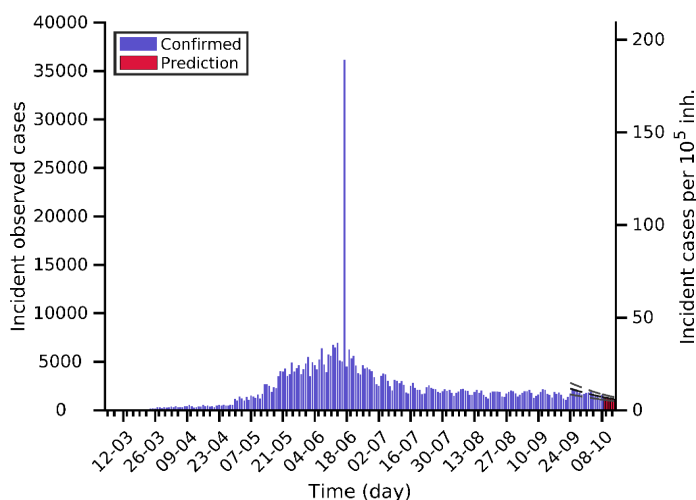


Predictions for next days

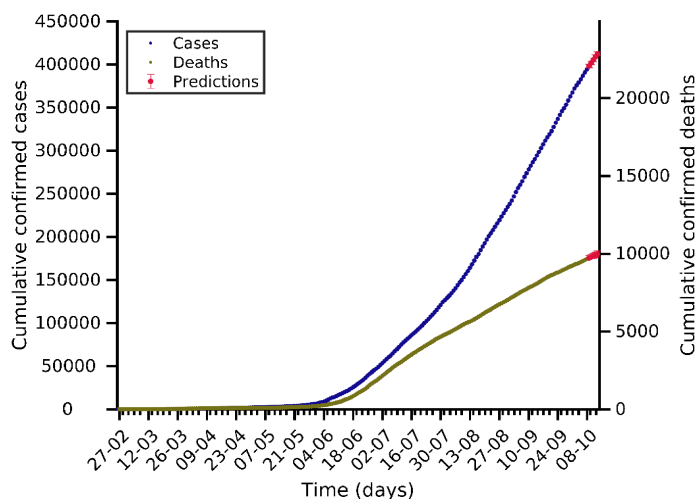
Day	Number of cases	95% Confidence Interval
09-10-2020	477292 (+1276)	[476016 - 479233]
11-10-2020	479800 (+1231)	[477802 - 481798]
13-10-2020	482134 (+1146)	[480027 - 484241]

Current indicators

A ₁₄	EPG	CFR
128	116	2.83 %



Iraq 08-10-2020. Pop: 40.2M. Cumulative incidence: 981/10⁵

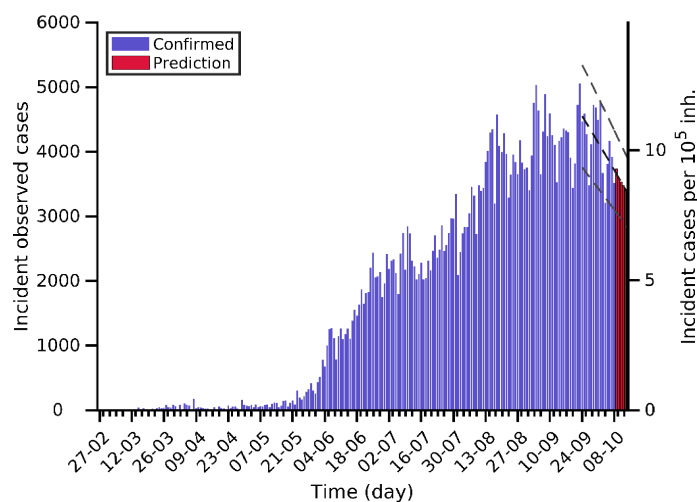


Predictions for next days

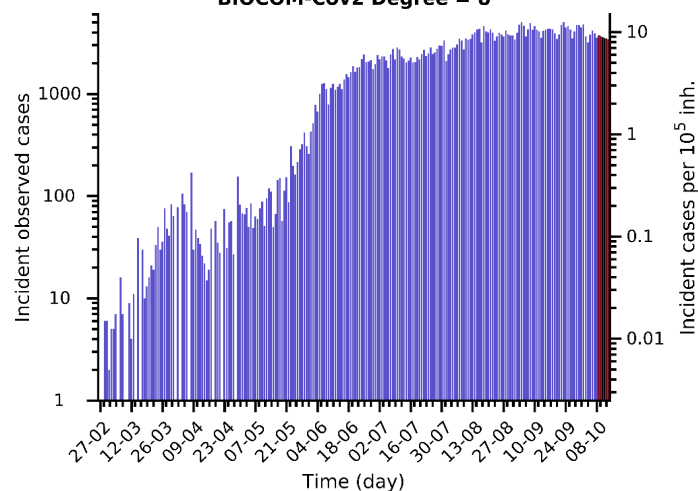
Day	Number of cases	95% Confidence Interval
09-10-2020	398300 (+3734)	[396218 - 400382]
11-10-2020	405430 (+3535)	[403275 - 407586]
13-10-2020	412319 (+3414)	[410013 - 414624]

Current indicators

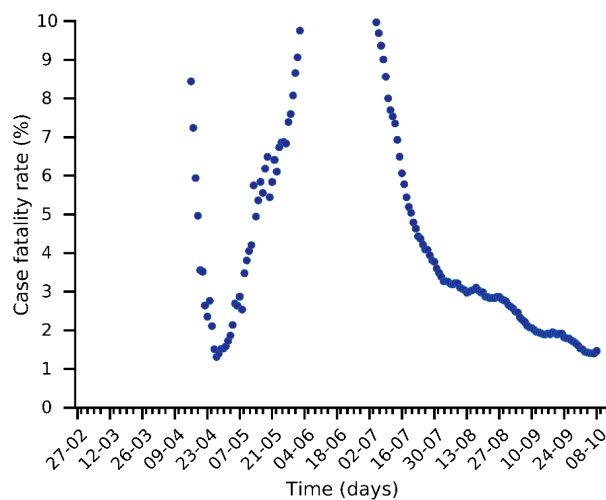
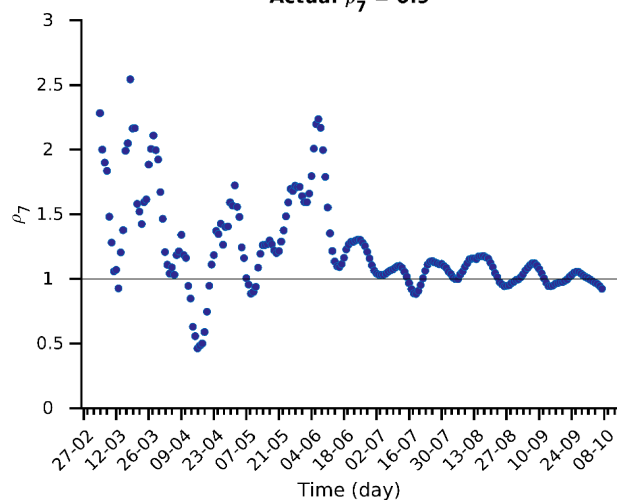
A ₁₄	EPG	CFR
143	132	1.46 %



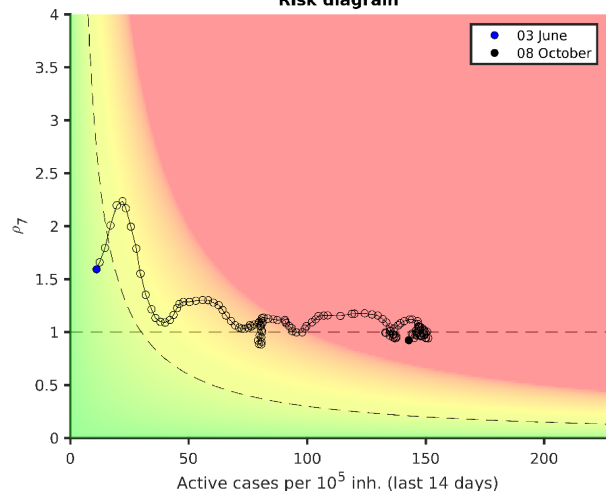
BIOCOM-Cov2 Degree = 8



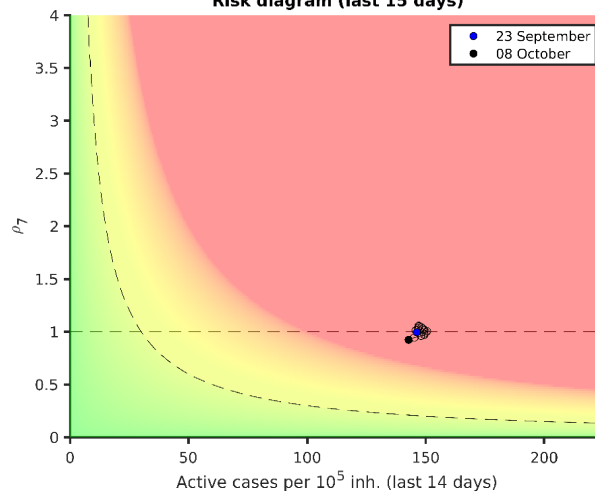
Actual $\rho_7 = 0.9$



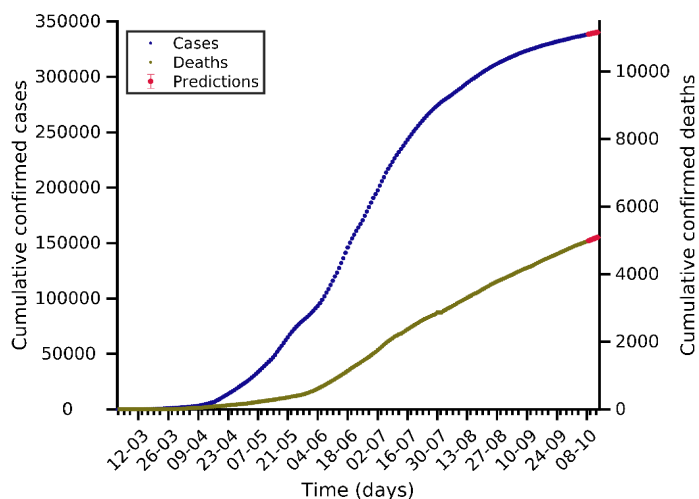
Risk diagram



Risk diagram (last 15 days)



Saudi Arabia 08-10-2020. Pop: 34.8M. Cumulative incidence: 971/10⁵

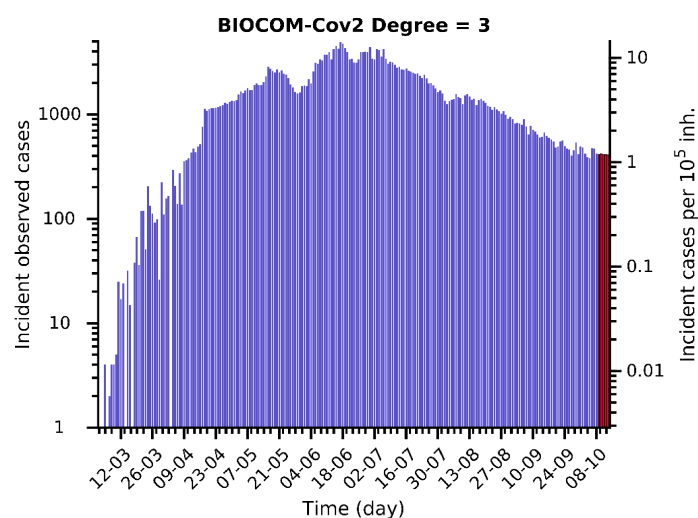
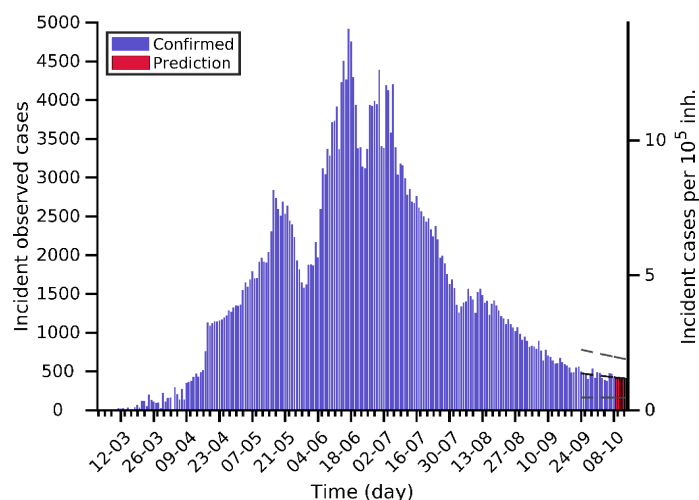


Predictions for next days

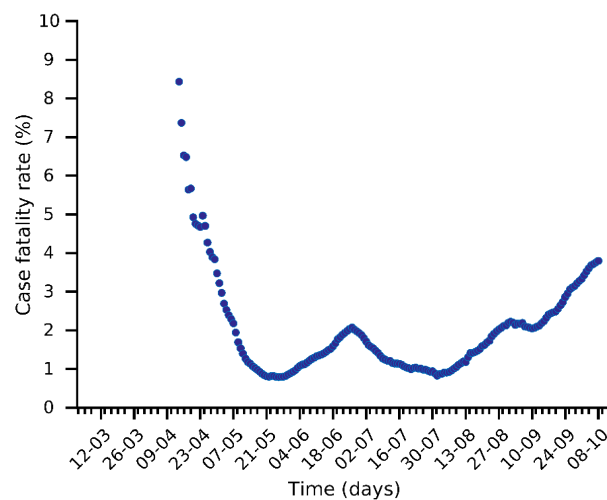
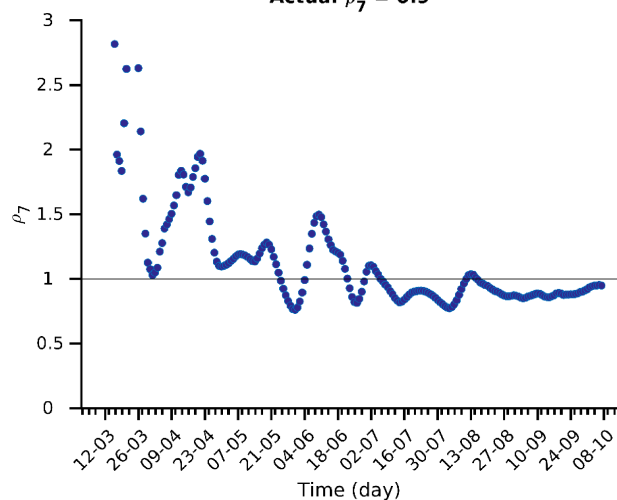
Day	Number of cases	95% Confidence Interval
09-10-2020	338545 (+413)	[338262 - 338827]
11-10-2020	339379 (+416)	[339086 - 339672]
13-10-2020	340201 (+409)	[339887 - 340515]

Current indicators

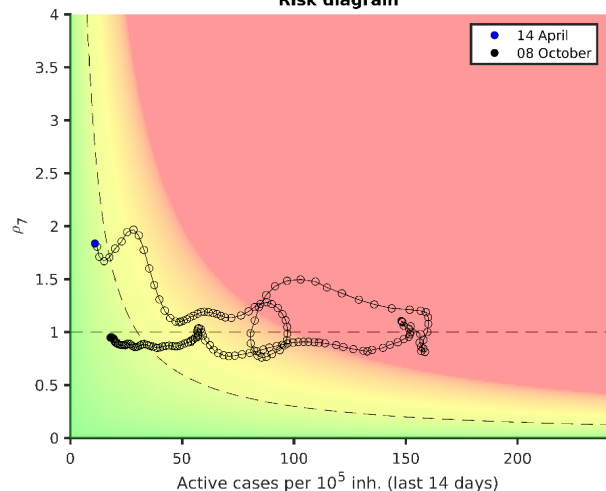
A ₁₄	EPG	CFR
18	17	3.80 %



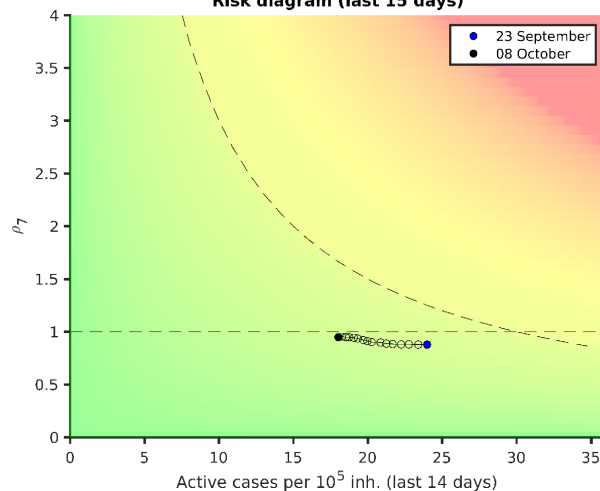
Actual $\rho_7 = 0.9$



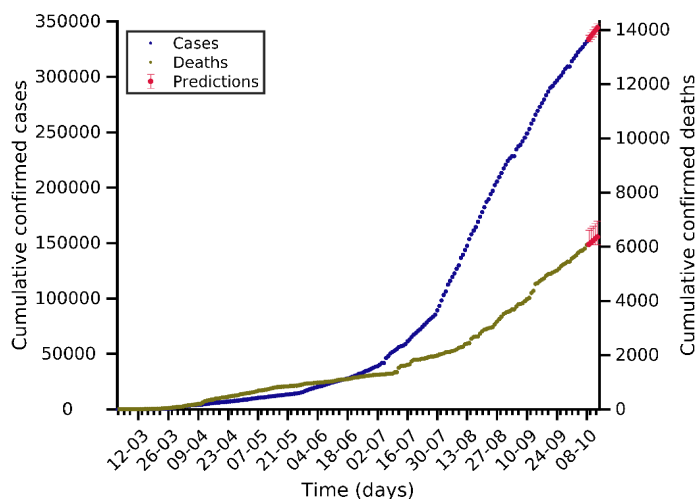
Risk diagram



Risk diagram (last 15 days)



Philippines 08-10-2020. Pop: 109.6M. Cumulative incidence: 303/10⁵

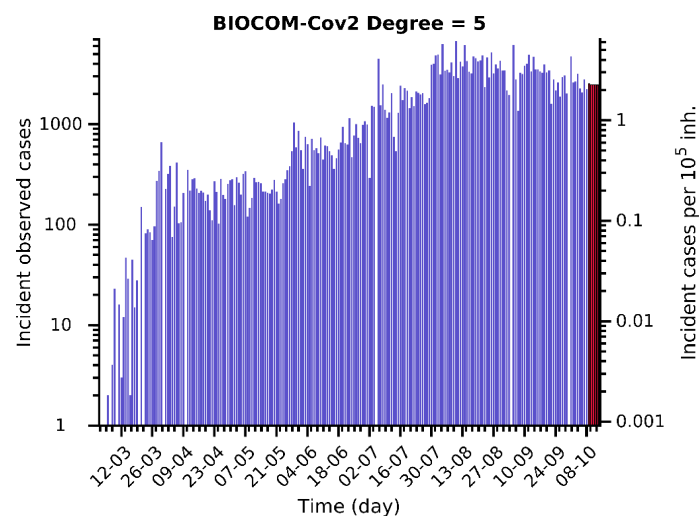
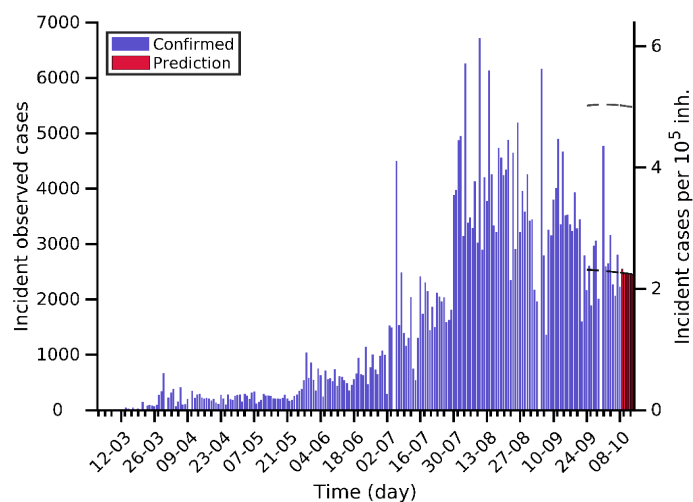


Predictions for next days

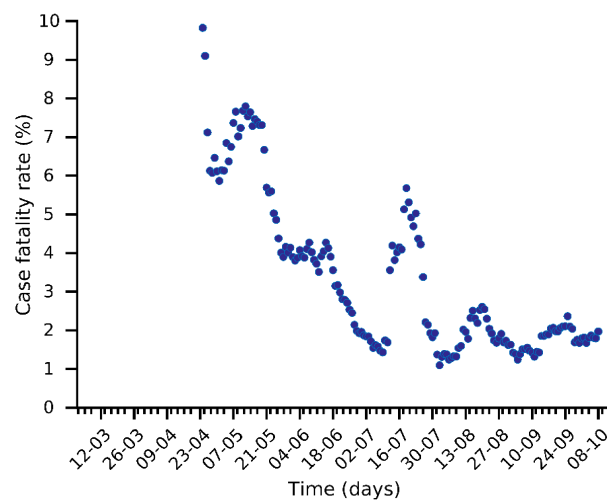
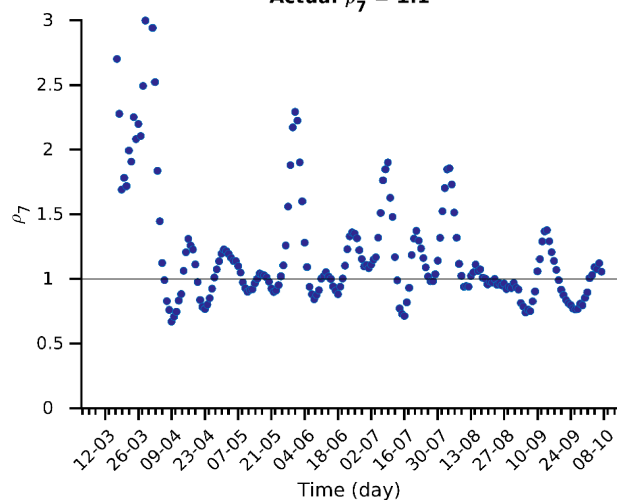
Day	Number of cases	95% Confidence Interval
09-10-2020	334411 (+2542)	[331869 - 337516]
11-10-2020	339356 (+2470)	[336130 - 342583]
13-10-2020	344280 (+2459)	[340795 - 347765]

Current indicators

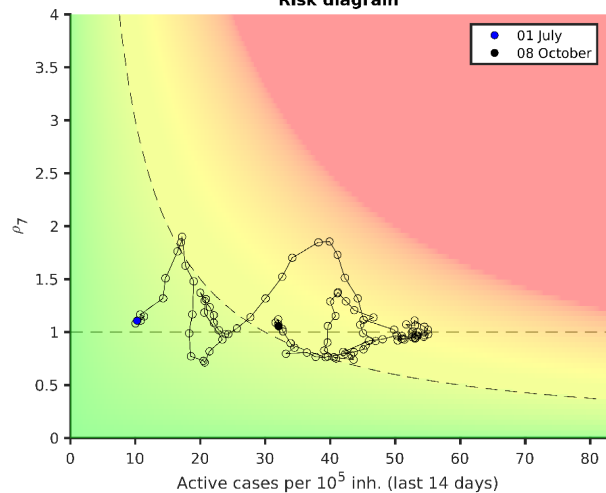
A ₁₄	EPG	CFR
32	34	1.97 %



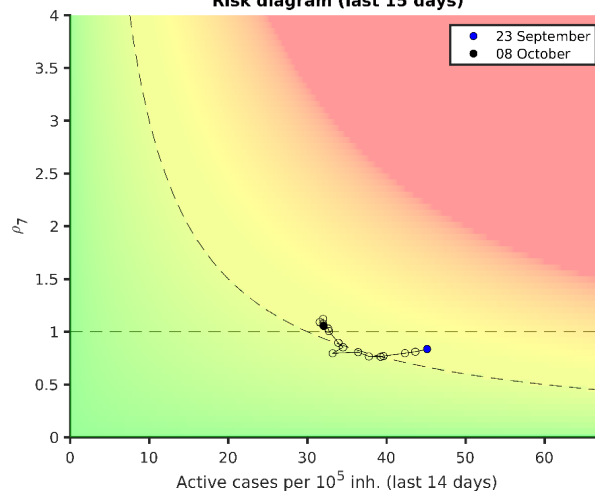
Actual $\rho_7 = 1.1$



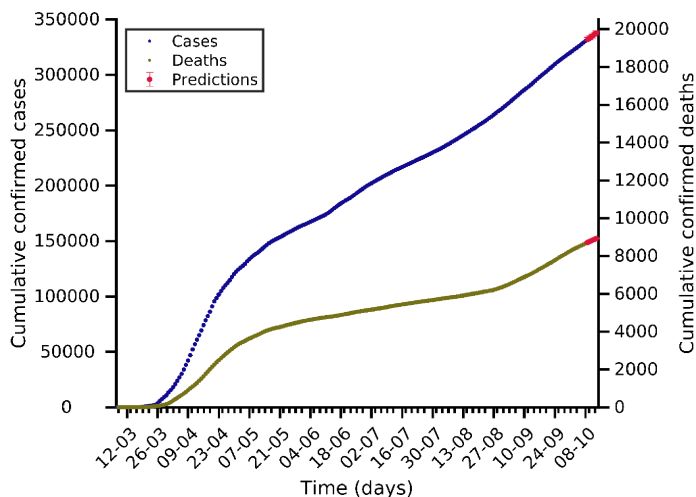
Risk diagram



Risk diagram (last 15 days)



Turkey 08-10-2020. Pop: 84.3M. Cumulative incidence: 392/10⁵

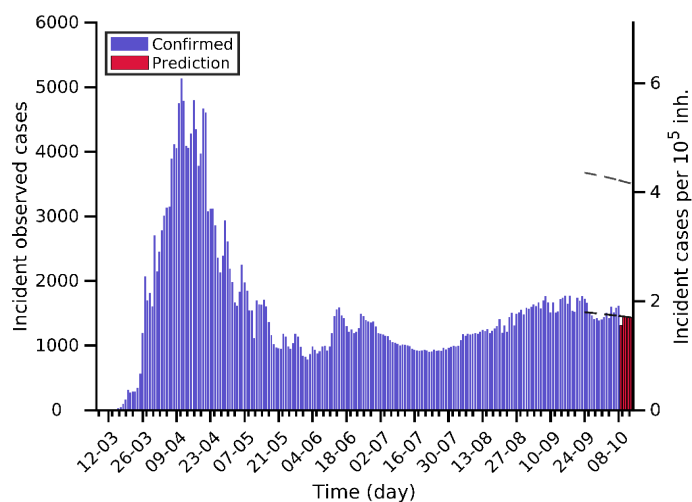


Predictions for next days

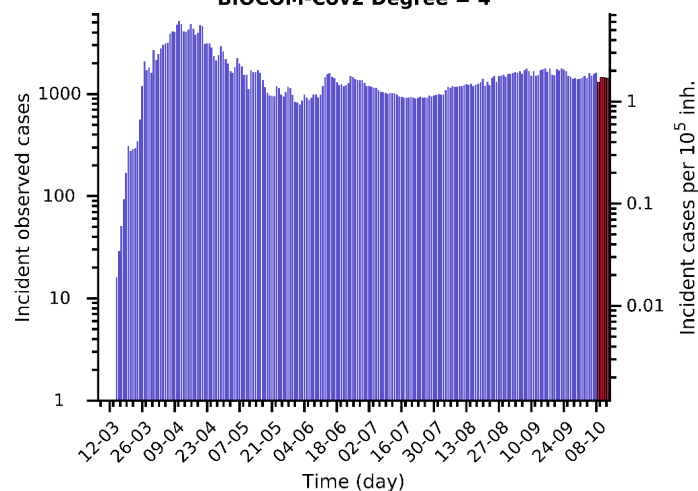
Day	Number of cases	95% Confidence Interval
09-10-2020	332064 (+1311)	[330753 - 333776]
11-10-2020	334962 (+1447)	[333184 - 336740]
13-10-2020	337843 (+1438)	[335926 - 339760]

Current indicators

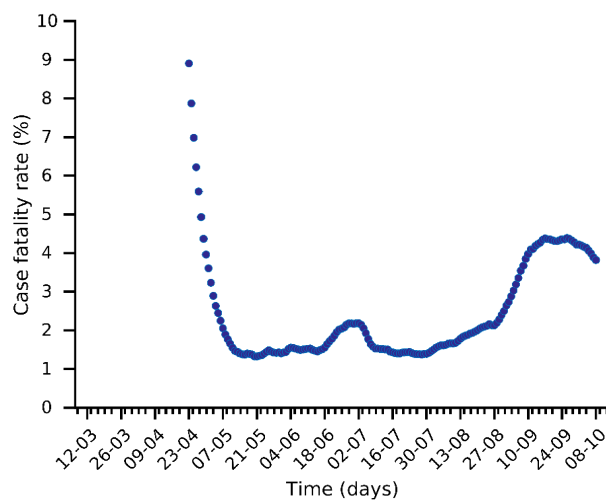
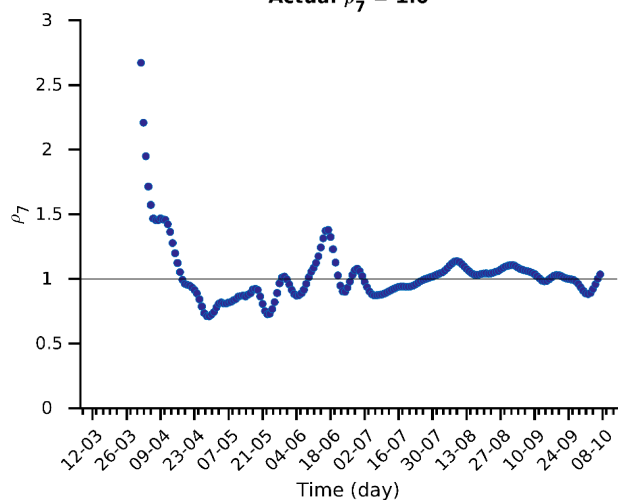
A ₁₄	EPG	CFR
25	26	3.82 %



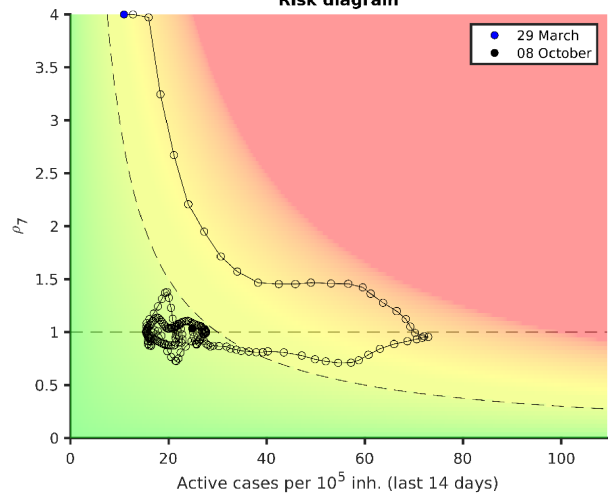
BIOCOM-Cov2 Degree = 4



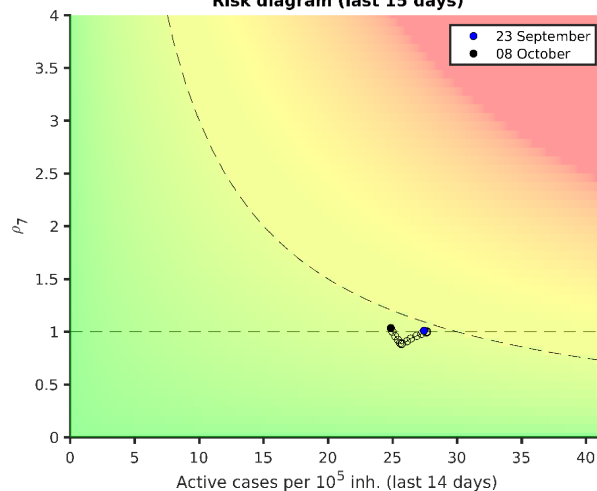
Actual $\rho_7 = 1.0$



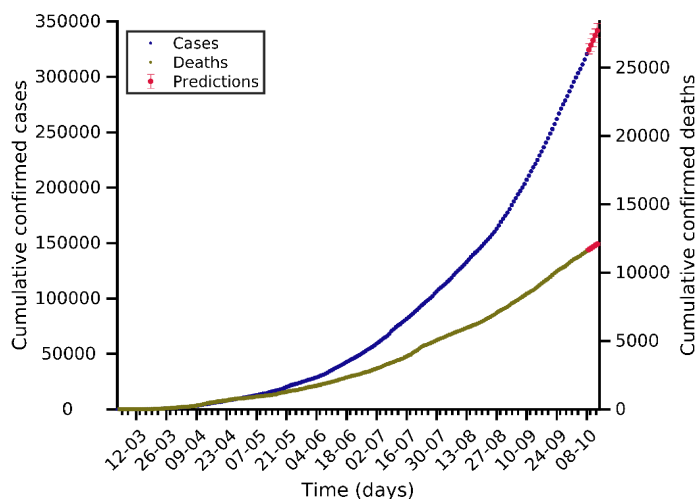
Risk diagram



Risk diagram (last 15 days)



Indonesia 08-10-2020. Pop: 273.5M. Cumulative incidence: 117/10⁵

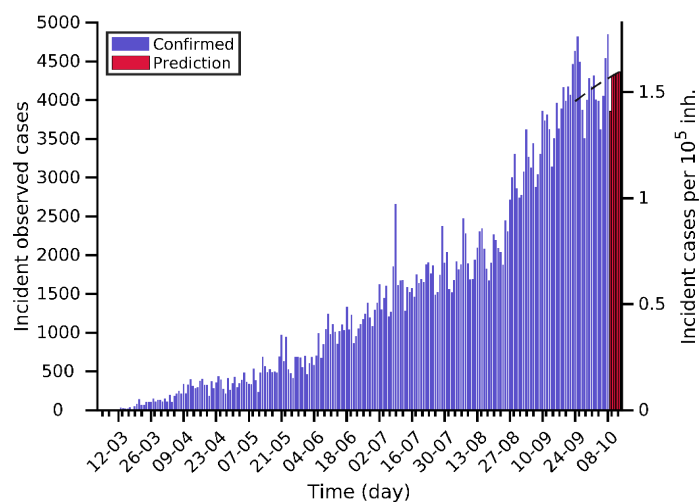


Predictions for next days

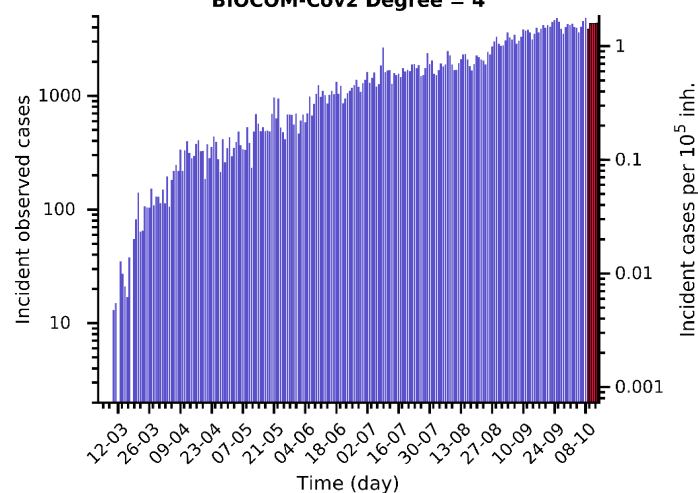
Day	Number of cases	95% Confidence Interval
09-10-2020	324418 (+3854)	[320564 - 329985]
11-10-2020	333065 (+4332)	[327265 - 338864]
13-10-2020	341777 (+4364)	[335467 - 348087]

Current indicators

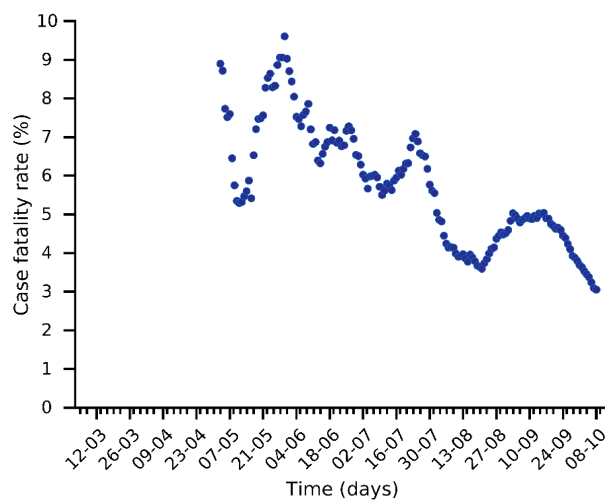
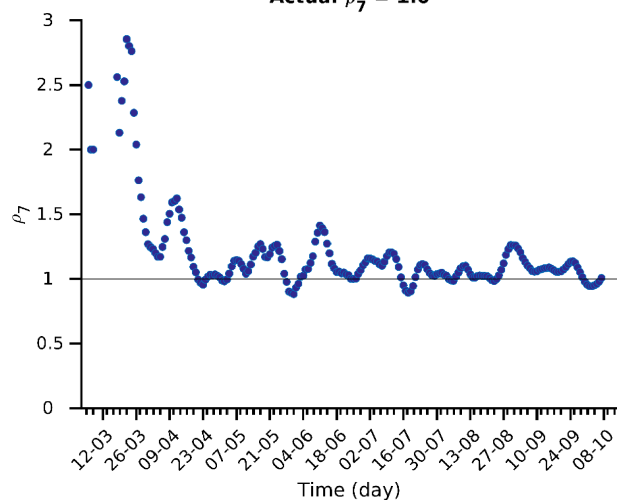
A ₁₄	EPG	CFR
21	22	3.05 %



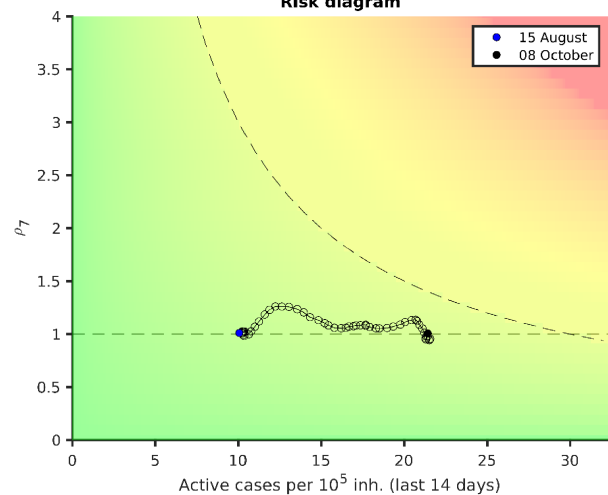
BIOCOM-Cov2 Degree = 4



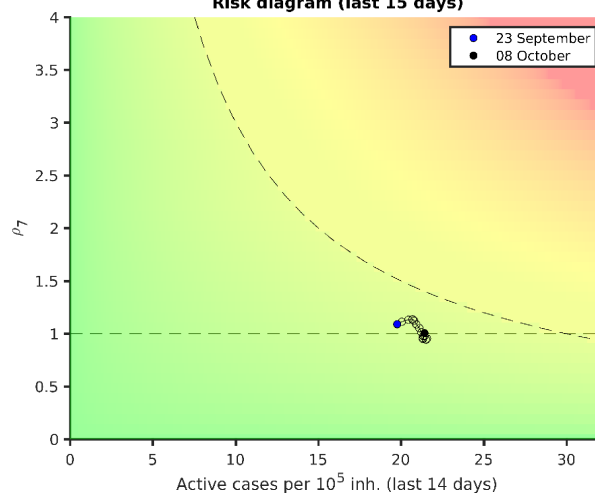
Actual $\rho_7 = 1.0$



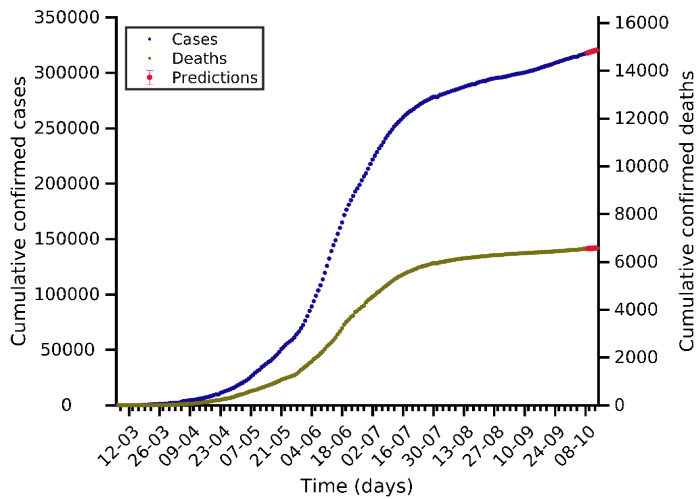
Risk diagram



Risk diagram (last 15 days)



Pakistan 08-10-2020. Pop: 220.9M. Cumulative incidence: 144/10⁵

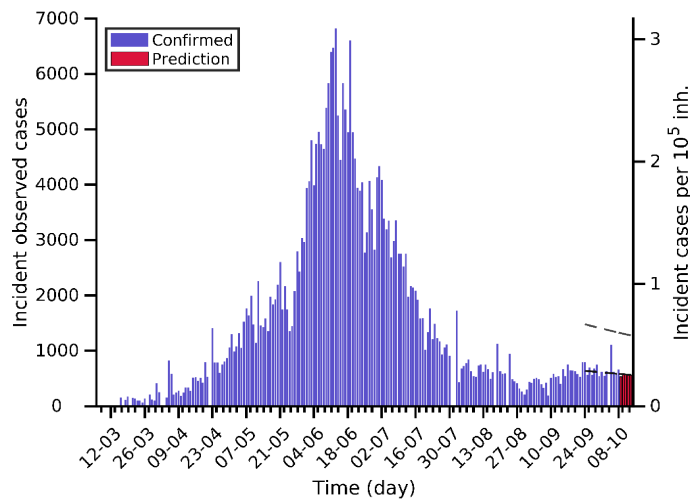


Predictions for next days

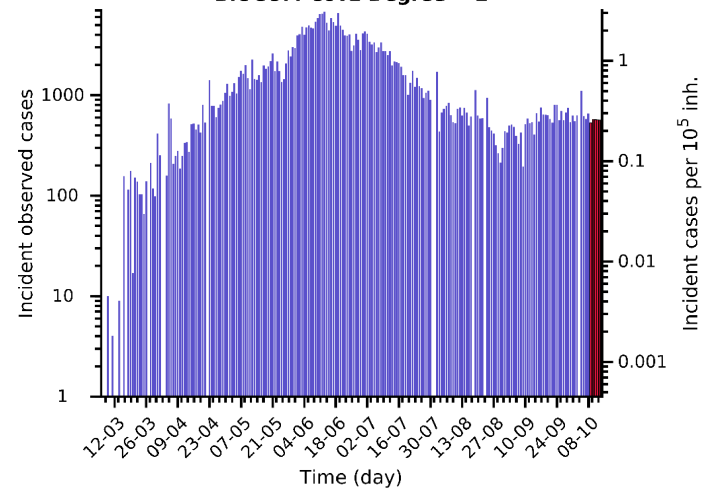
Day	Number of cases	95% Confidence Interval
09-10-2020	318127 (+532)	[317595 - 318844]
11-10-2020	319277 (+573)	[318534 - 320021]
13-10-2020	320413 (+566)	[319614 - 321211]

Current indicators

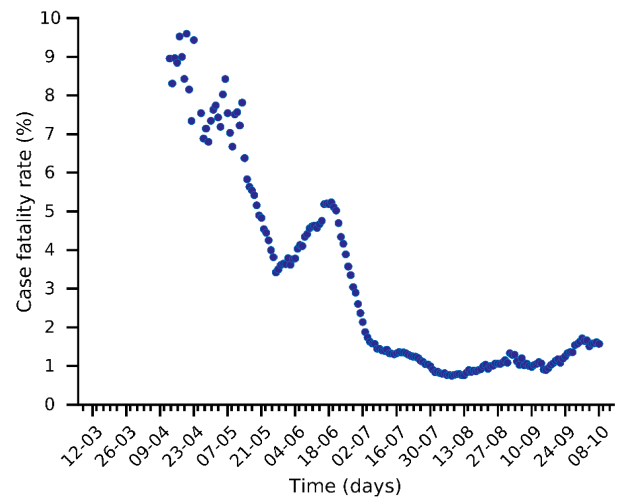
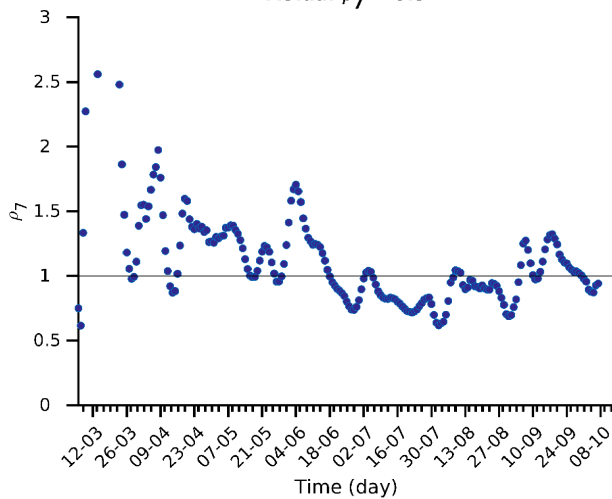
A ₁₄	EPG	CFR
4	4	1.57 %



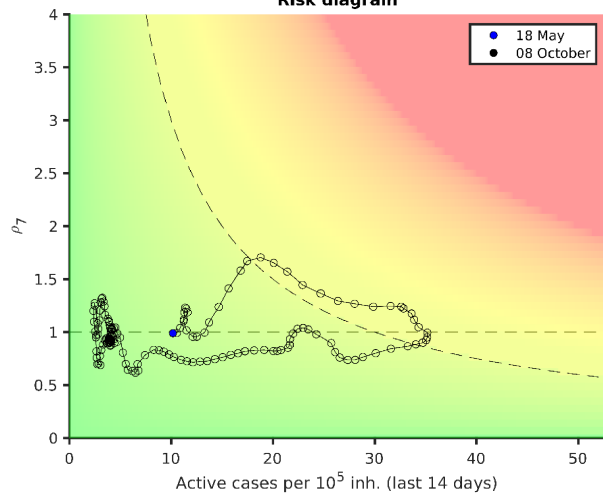
BIOCOM-Cov2 Degree = 2



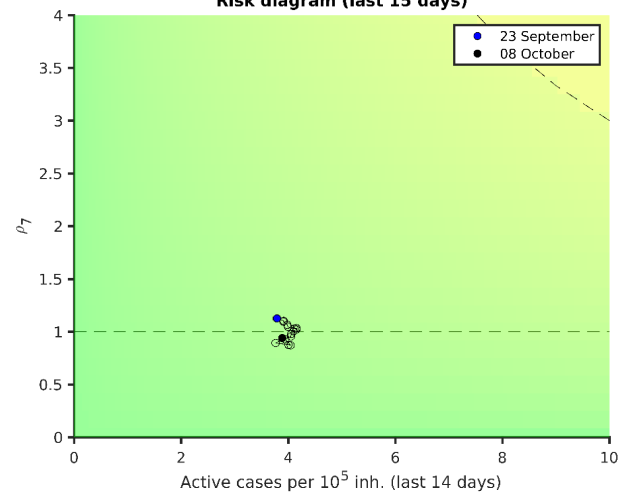
Actual $\rho_7 = 0.9$



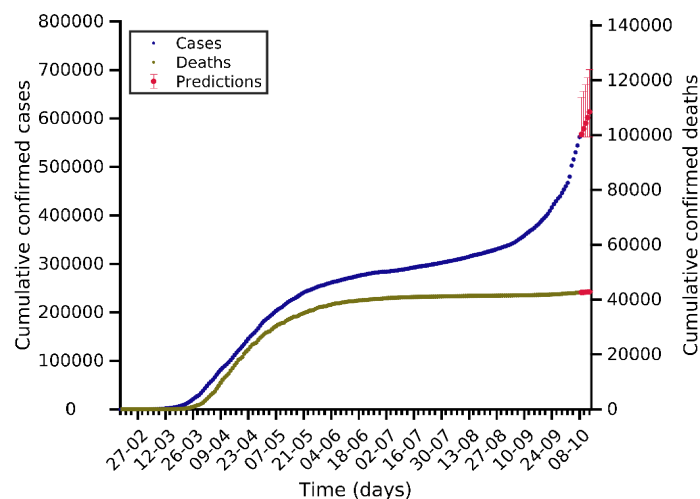
Risk diagram



Risk diagram (last 15 days)



Israel 08-10-2020. Pop: 8.7M. Cumulative incidence: 3309/10⁵

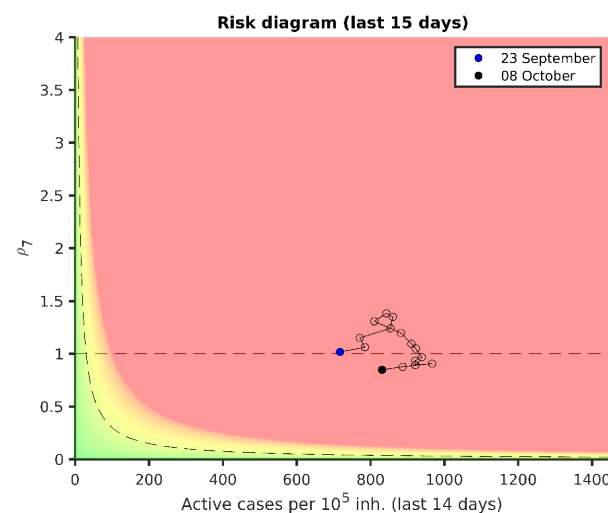
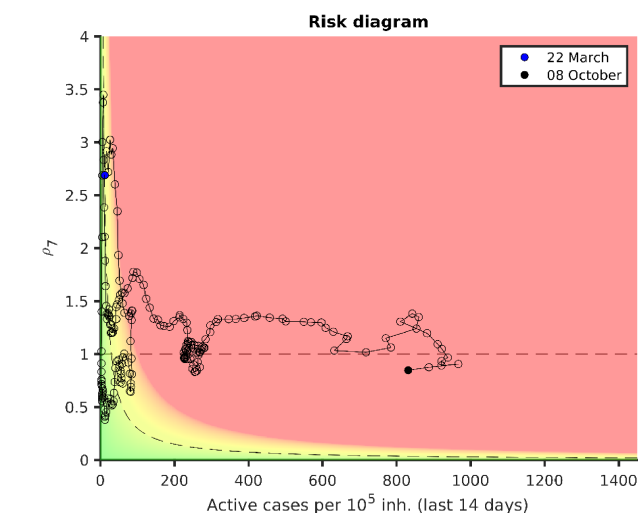
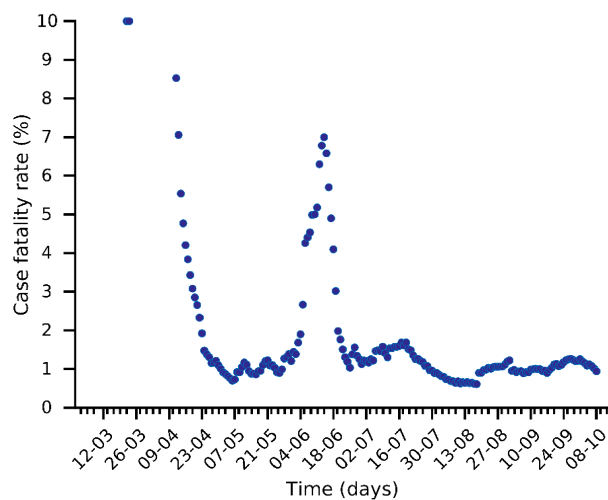
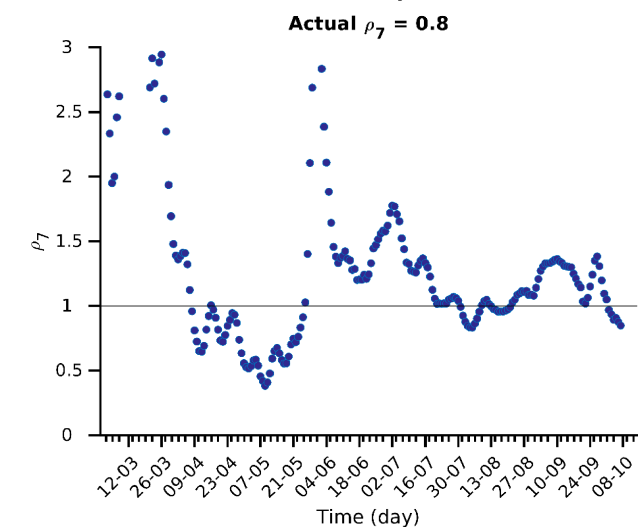
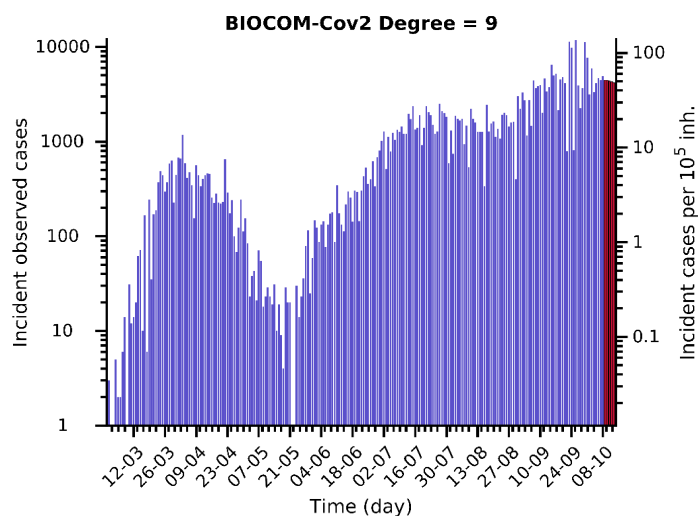
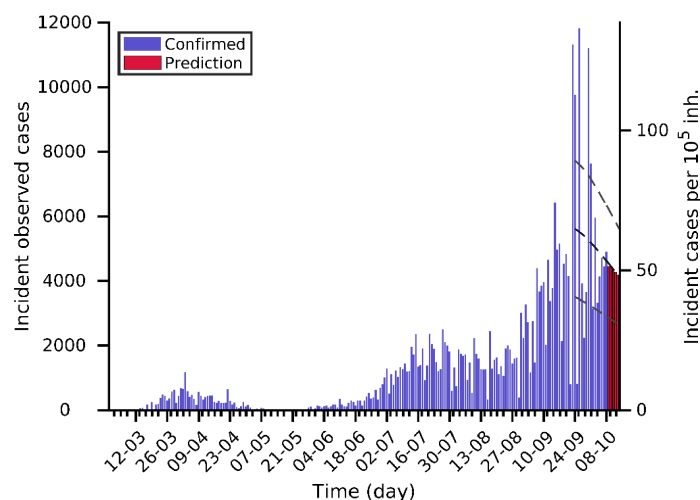


Predictions for next days

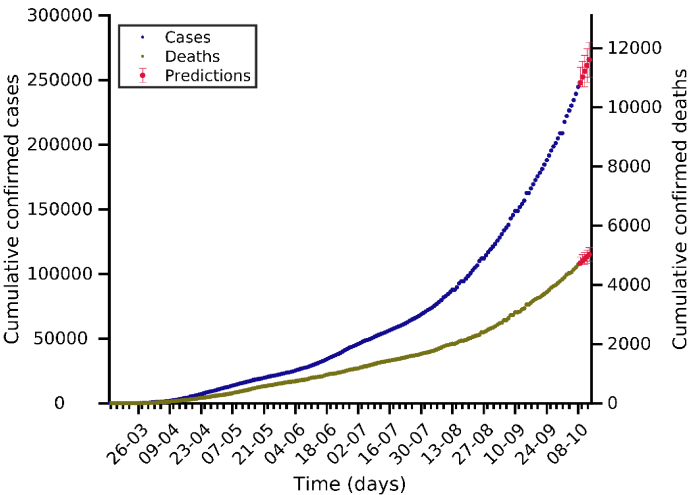
Day	Number of cases	95% Confidence Interval
09-10-2020	290836 (+4443)	[286393 - 298708]
11-10-2020	299649 (+4363)	[291495 - 307803]
13-10-2020	308109 (+4185)	[299382 - 316836]

Current indicators

A ₁₄	EPG	CFR
831	705	0.94 %

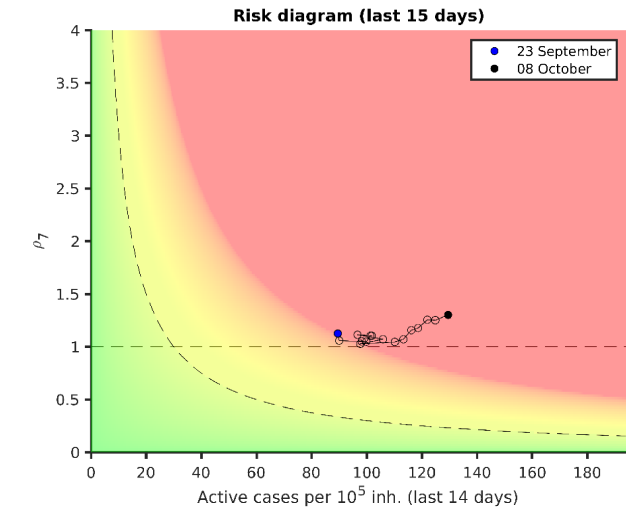
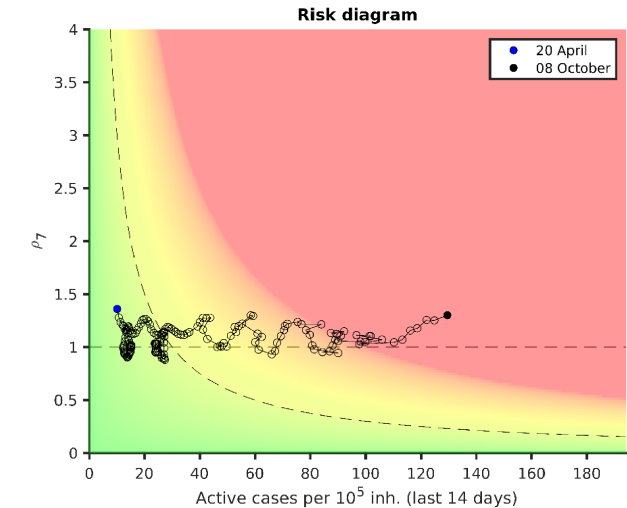
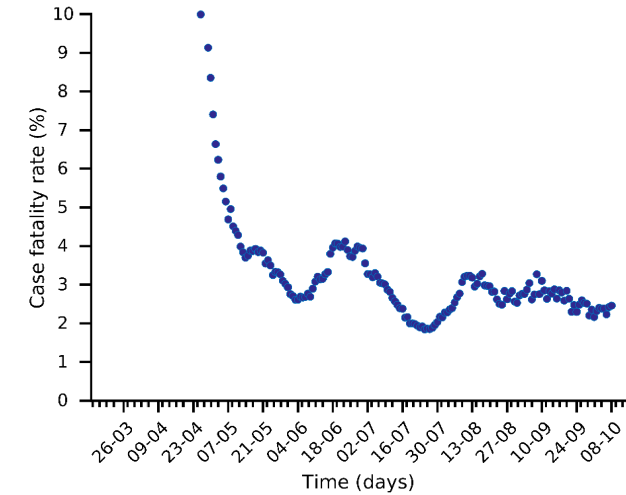
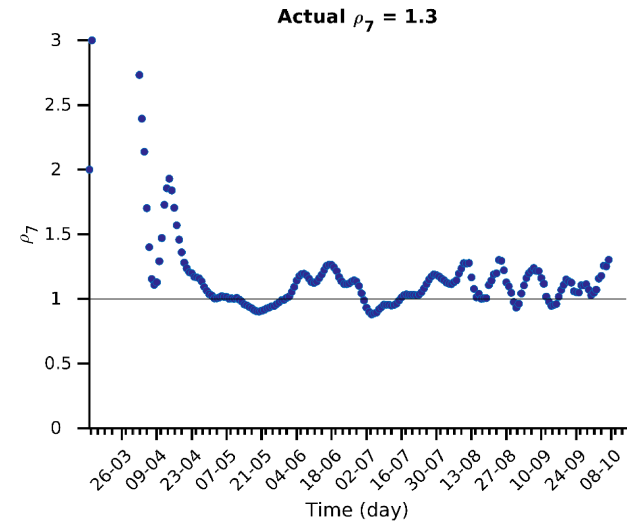
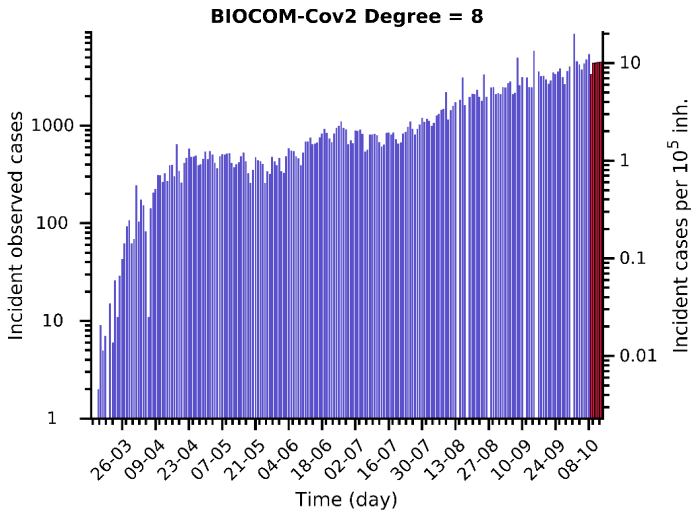
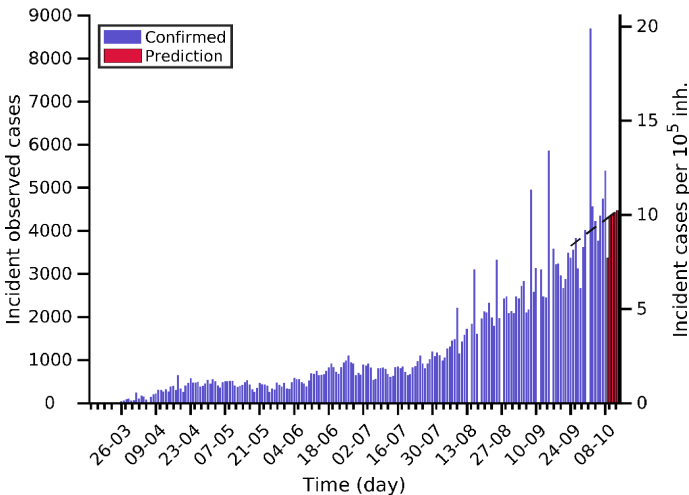


Ukraine 08-10-2020. Pop: 43.7M. Cumulative incidence: 560/10⁵

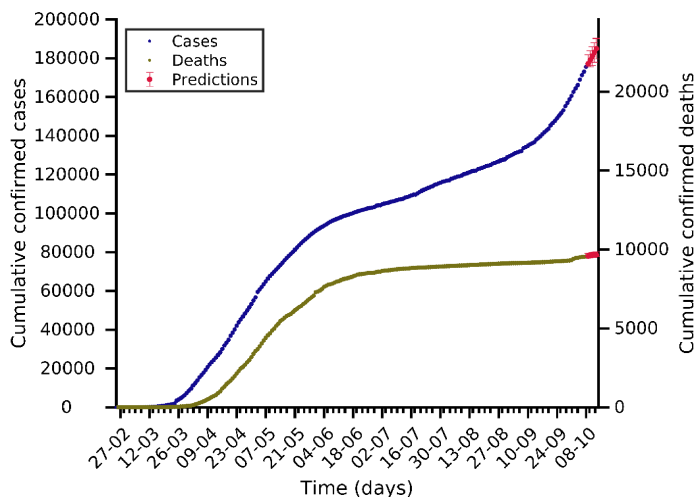


Predictions for next days		
Day	Number of cases	95% Confidence Interval
09-10-2020	248103 (+3369)	[244734 - 259949]
11-10-2020	256836 (+4388)	[244734 - 269209]
13-10-2020	265740 (+4473)	[252188 - 279291]

Current indicators		
A ₁₄	EPG	CFR
129	169	2.45 %



Canada 08-10-2020. Pop: 37.7M. Cumulative incidence: 465/10⁵

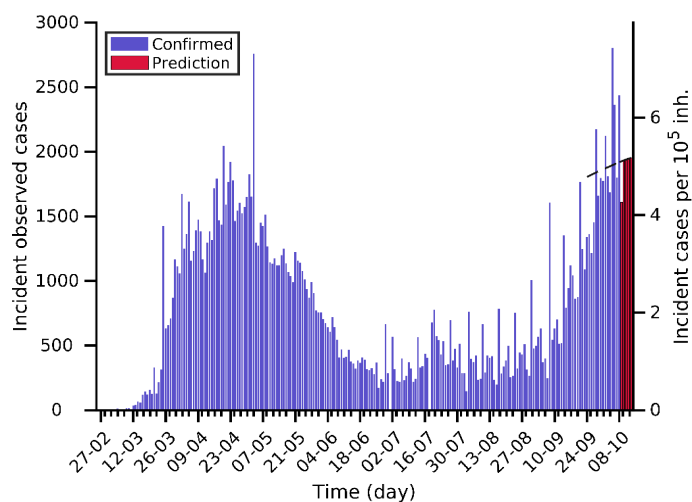


Predictions for next days

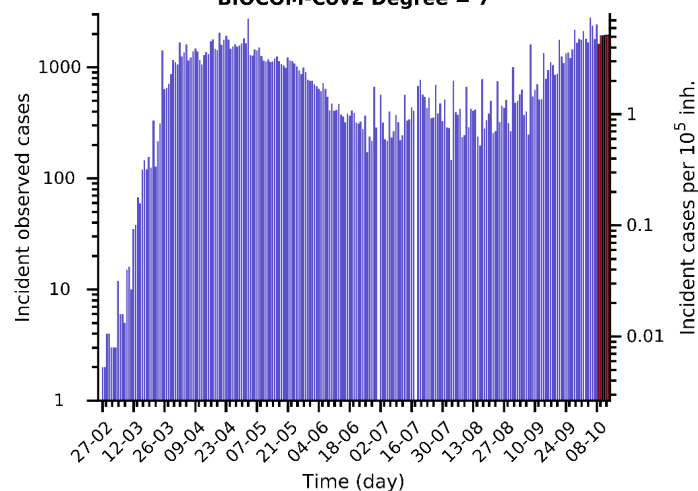
Day	Number of cases	95% Confidence Interval
09-10-2020	177168 (+1609)	[175559 - 181826]
11-10-2020	181041 (+1940)	[176191 - 185891]
13-10-2020	184942 (+1954)	[179672 - 190212]

Current indicators

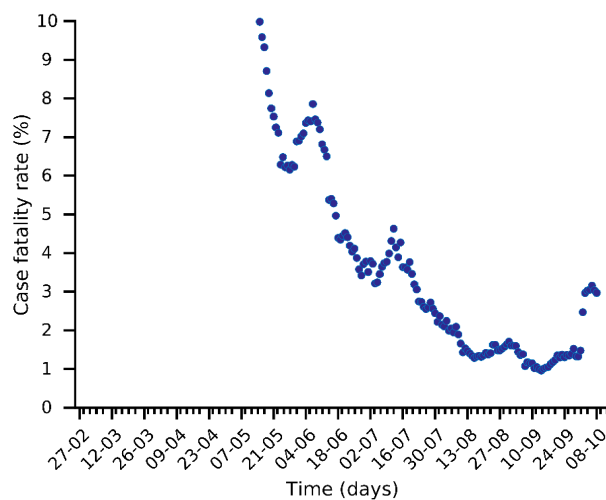
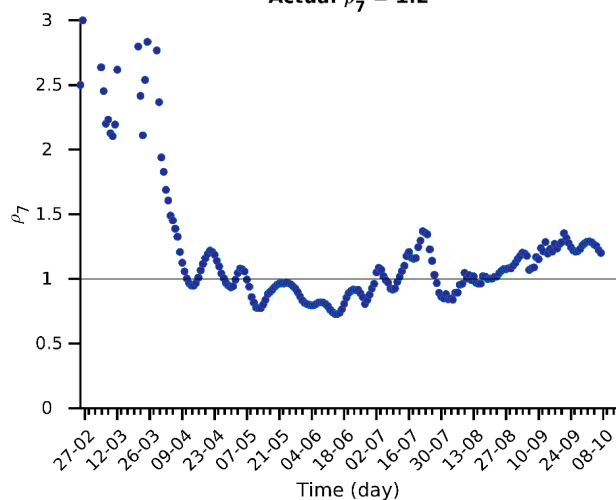
A ₁₄	EPG	CFR
70	84	2.97 %



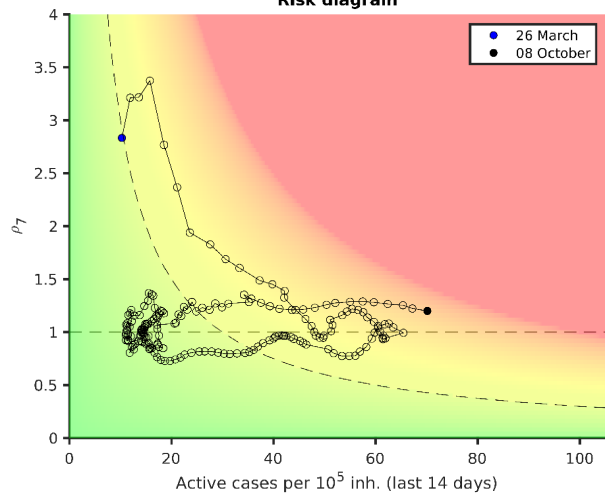
BIOCOM-Cov2 Degree = 7



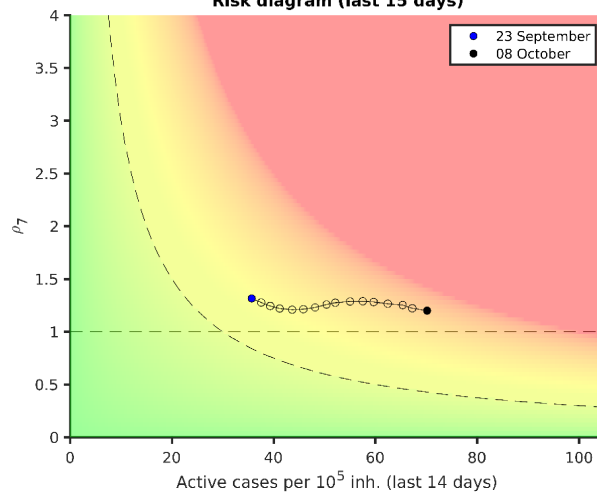
Actual $\rho_7 = 1.2$



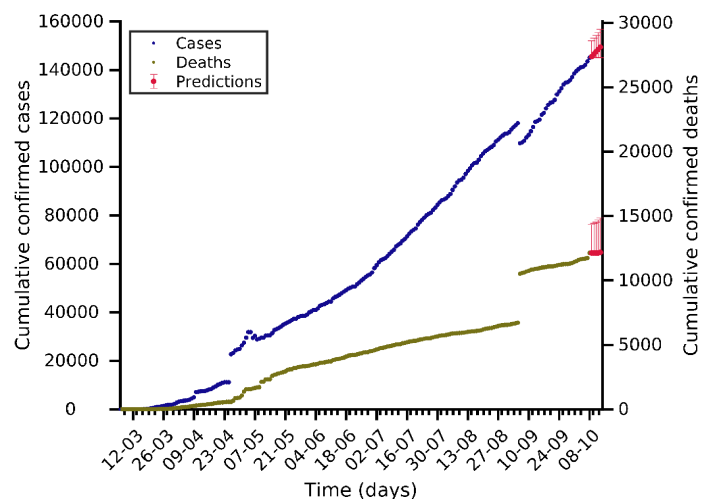
Risk diagram



Risk diagram (last 15 days)



Ecuador 08-10-2020. Pop: 17.6M. Cumulative incidence: 822/10⁵

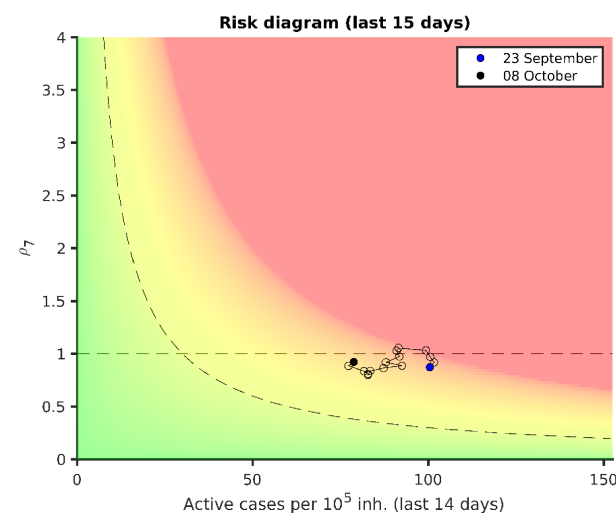
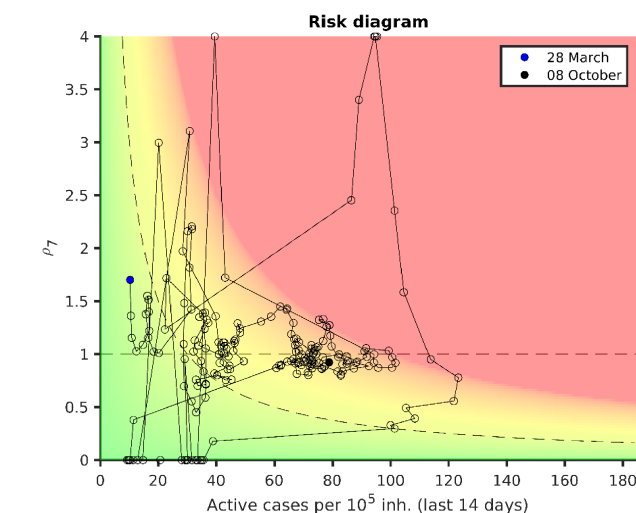
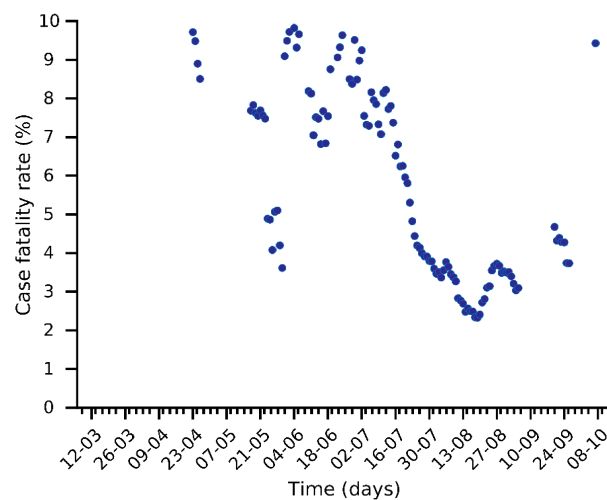
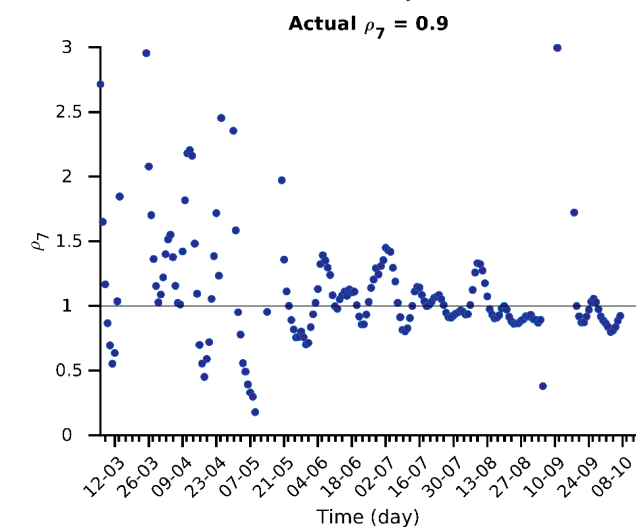
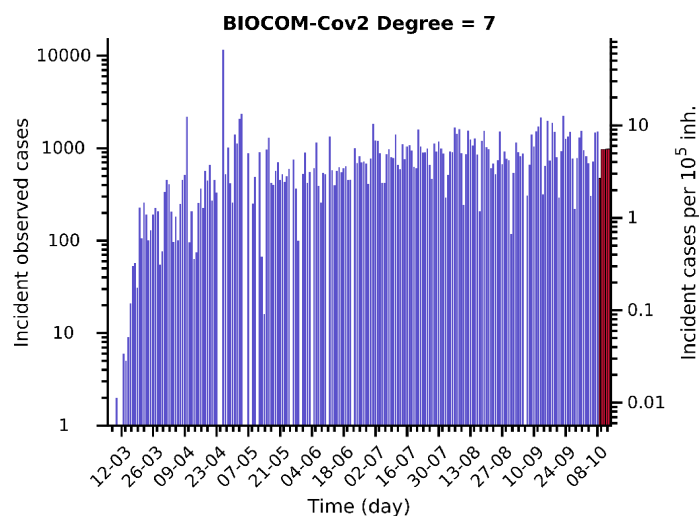
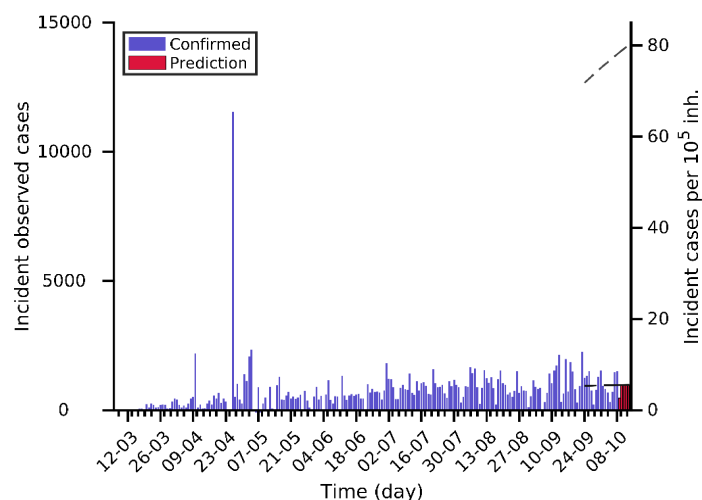


Predictions for next days

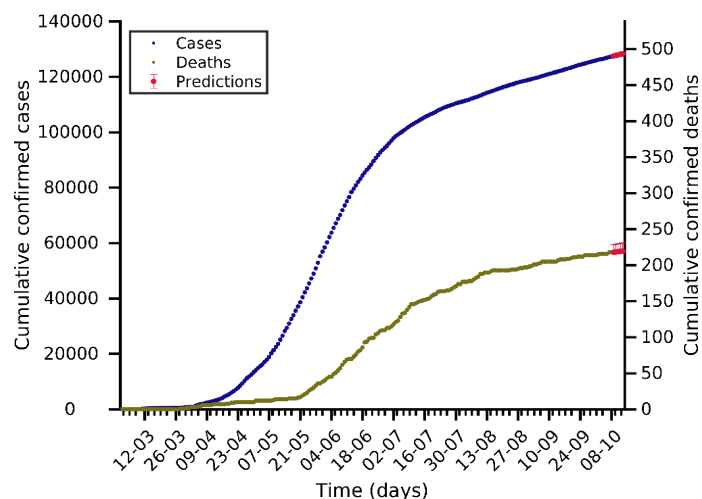
Day	Number of cases	95% Confidence Interval
09-10-2020	145517 (+472)	[145045 - 152020]
11-10-2020	147464 (+974)	[145045 - 154228]
13-10-2020	149418 (+978)	[145045 - 156744]

Current indicators

A ₁₄	EPG	CFR
79	73	10.00 %



Qatar 08-10-2020. Pop: 2.9M. Cumulative incidence: 4422/10⁵

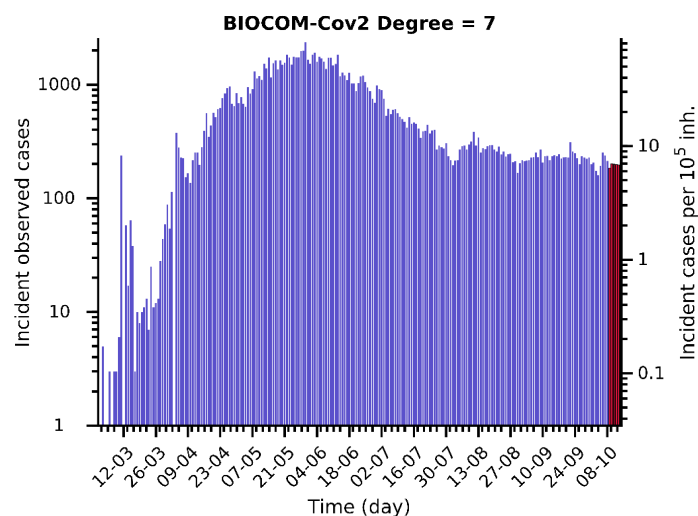
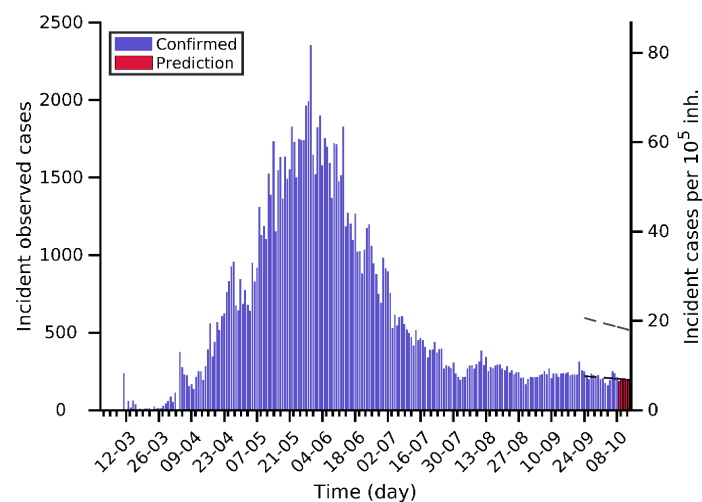


Predictions for next days

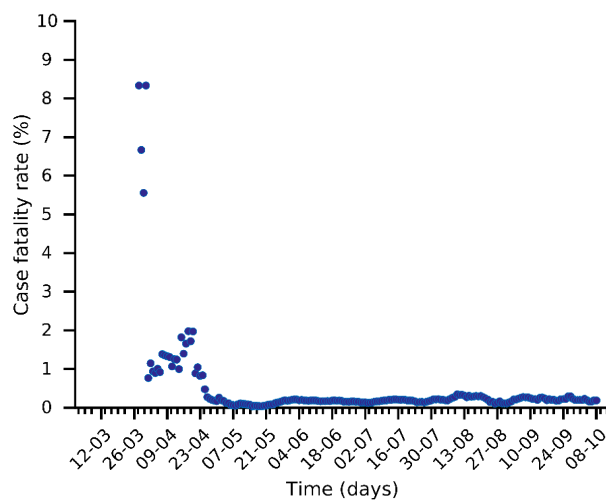
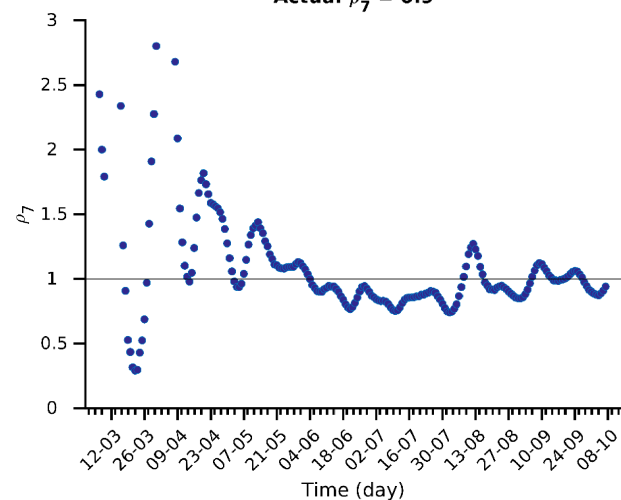
Day	Number of cases	95% Confidence Interval
09-10-2020	127578 (+184)	[127394 - 127871]
11-10-2020	127978 (+199)	[127675 - 128281]
13-10-2020	128373 (+197)	[128047 - 128699]

Current indicators

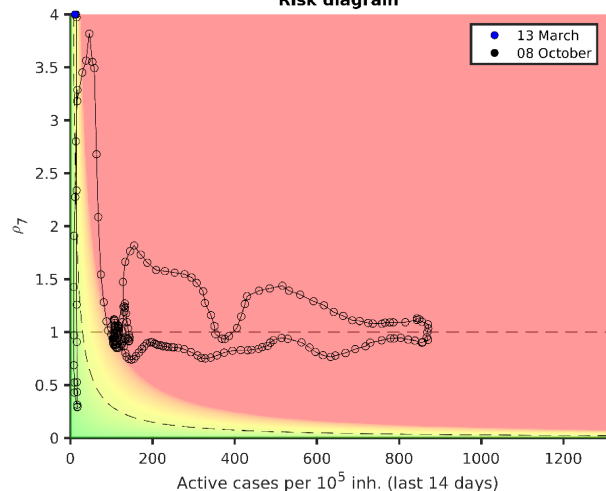
A ₁₄	EPG	CFR
103	97	0.18 %



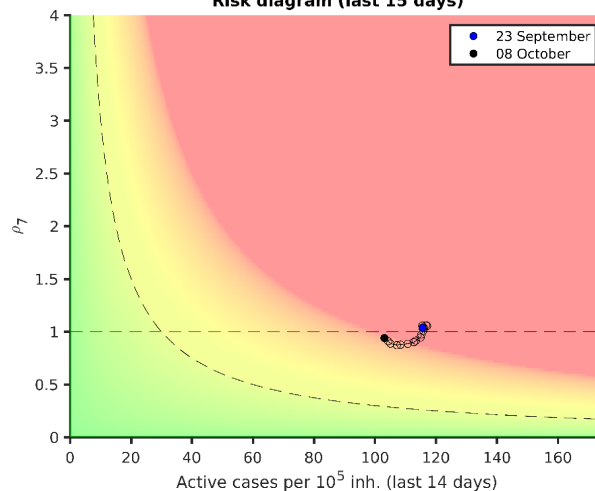
Actual $\rho_7 = 0.9$



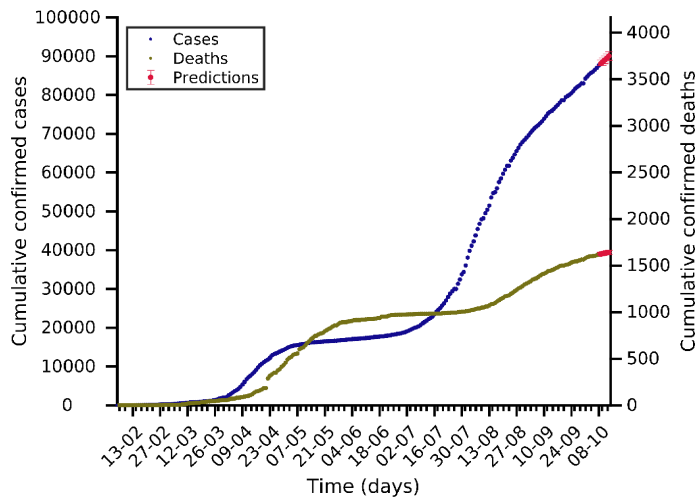
Risk diagram



Risk diagram (last 15 days)



Japan 08-10-2020. Pop: 126.5M. Cumulative incidence: 69/10⁵

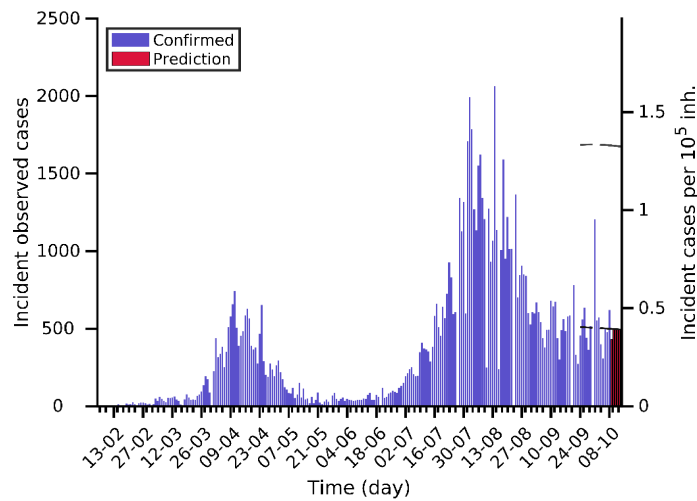


Predictions for next days

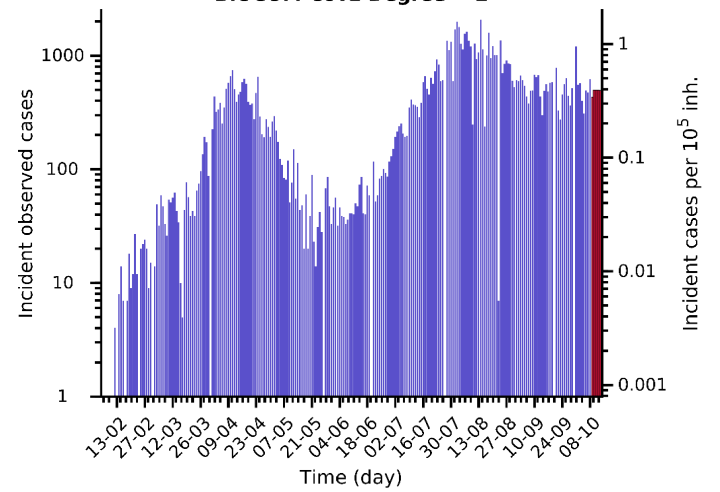
Day	Number of cases	95% Confidence Interval
09-10-2020	88069 (+430)	[87639 - 89035]
11-10-2020	89064 (+497)	[88060 - 90068]
13-10-2020	90056 (+495)	[88972 - 91139]

Current indicators

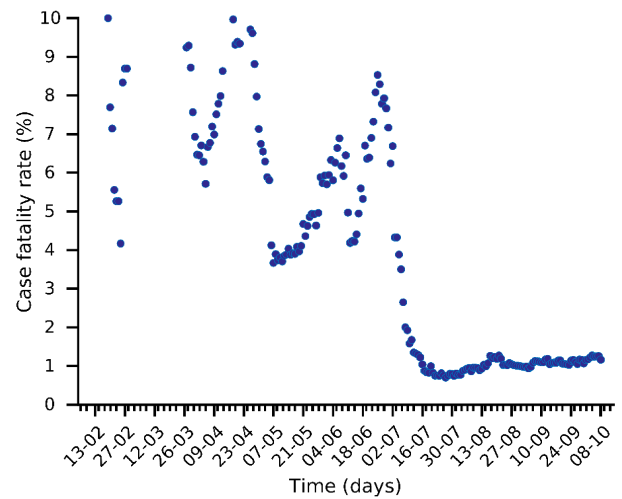
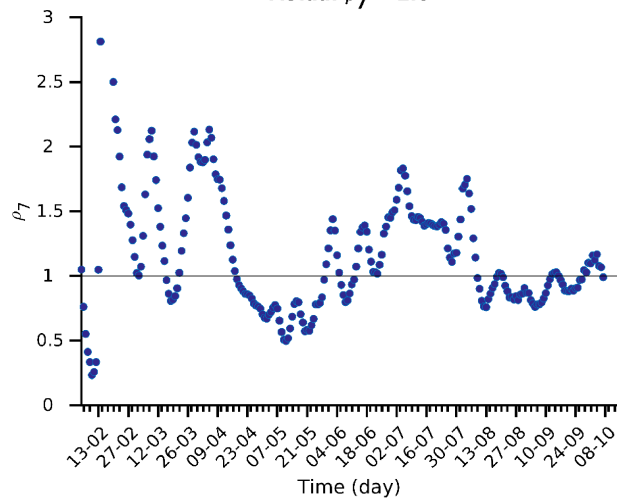
A ₁₄	EPG	CFR
6	6	1.16 %



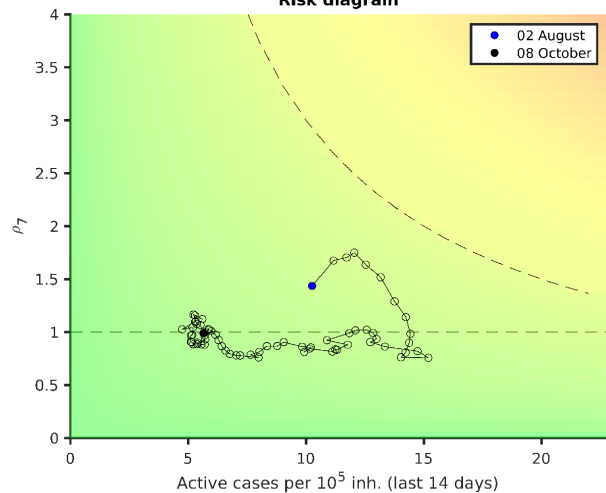
BIOCOM-Cov2 Degree = 2



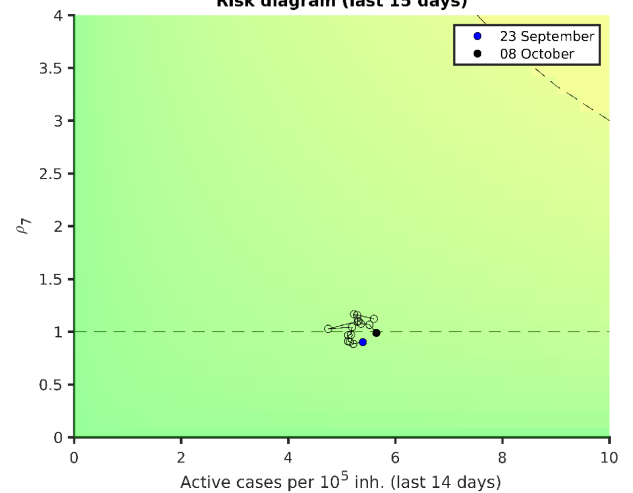
Actual $\rho_7 = 1.0$



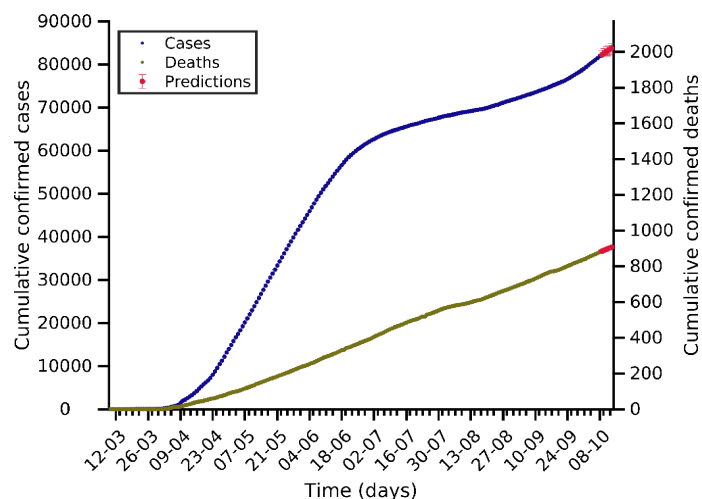
Risk diagram



Risk diagram (last 15 days)



Belarus 08-10-2020. Pop: 9.4M. Cumulative incidence: 868/10⁵

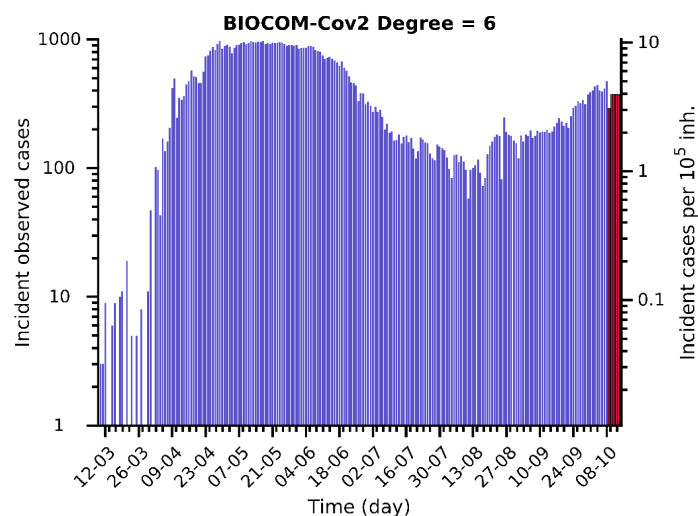
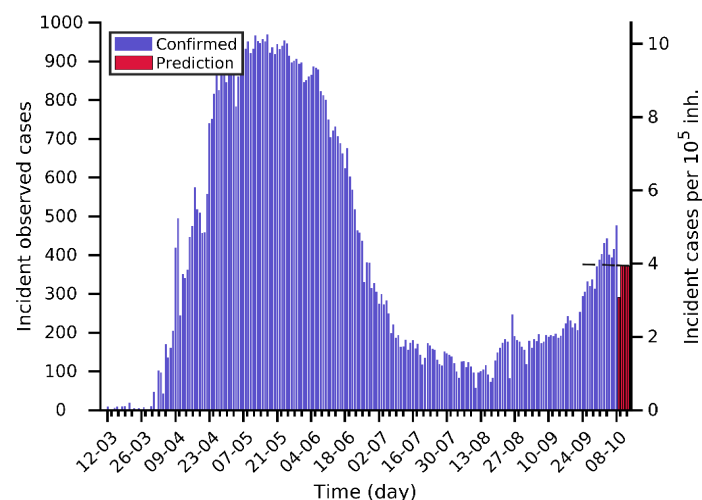


Predictions for next days

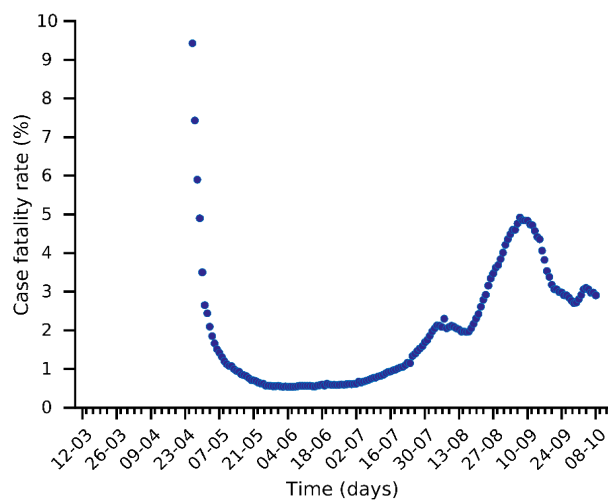
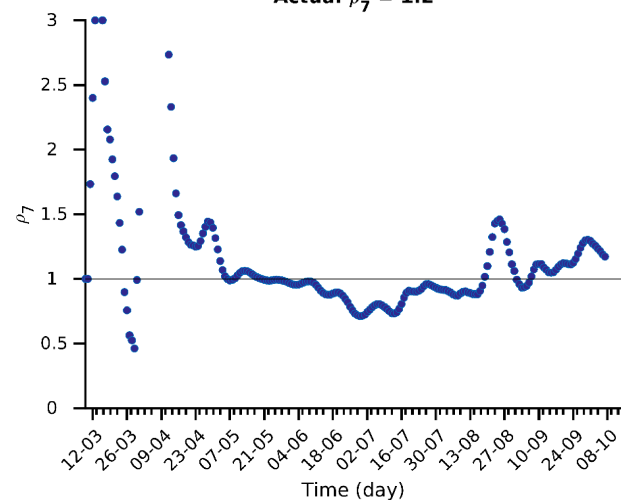
Day	Number of cases	95% Confidence Interval
09-10-2020	82273 (+291)	[81982 - 83314]
11-10-2020	83019 (+373)	[81982 - 84100]
13-10-2020	83764 (+372)	[82597 - 84932]

Current indicators

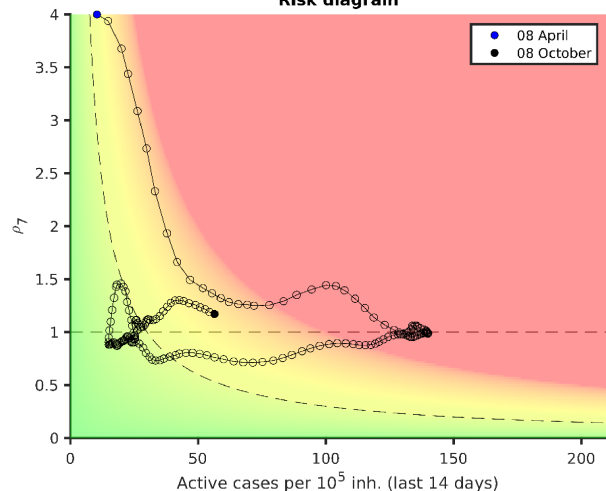
A ₁₄	EPG	CFR
56	66	2.91 %



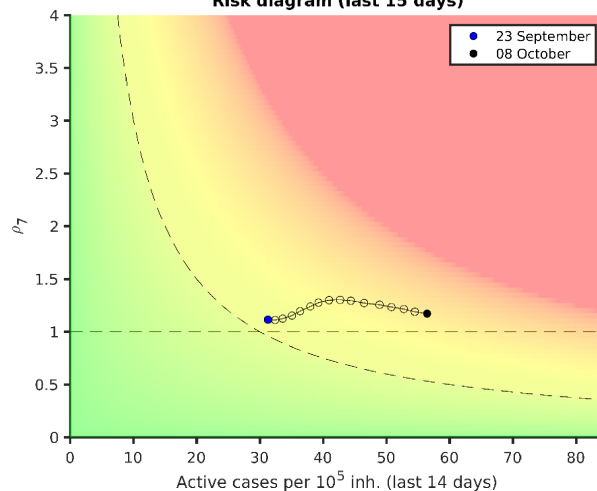
Actual $\rho_7 = 1.2$



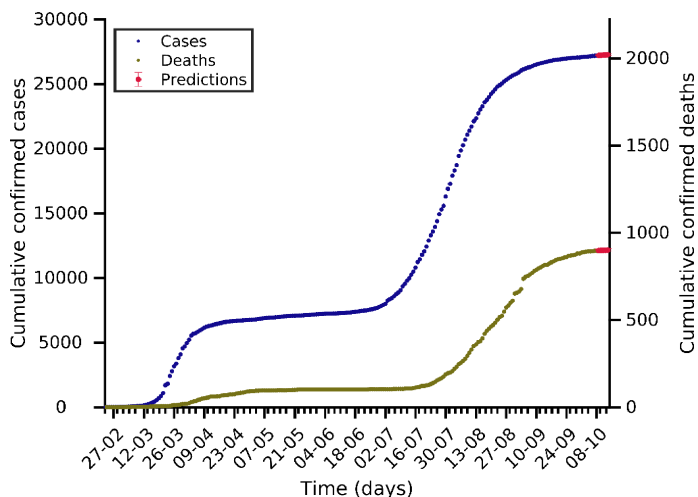
Risk diagram



Risk diagram (last 15 days)



Australia 08-10-2020. Pop: 25.5M. Cumulative incidence: 107/10⁵

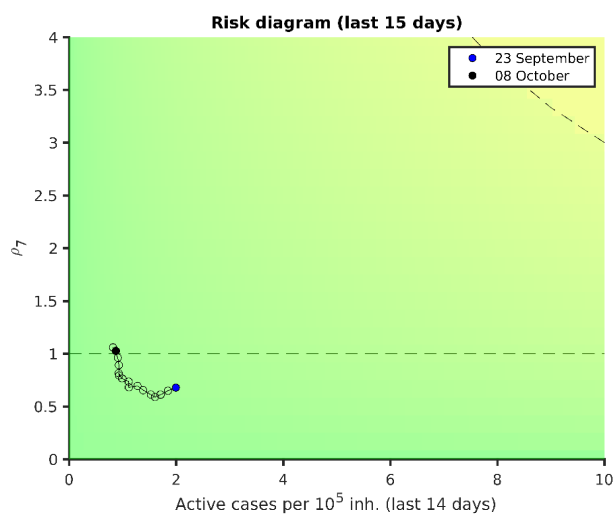
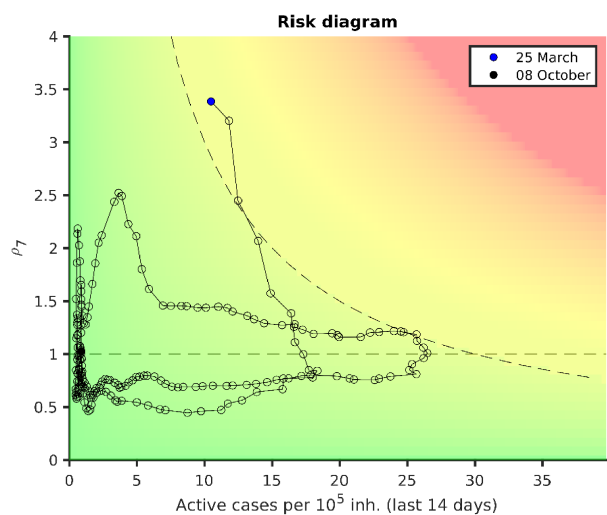
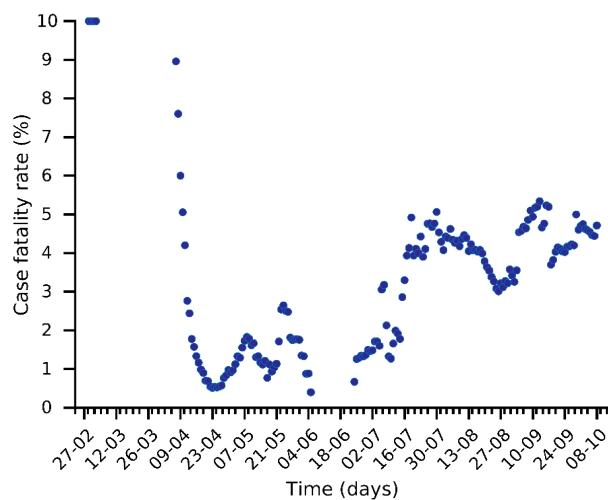
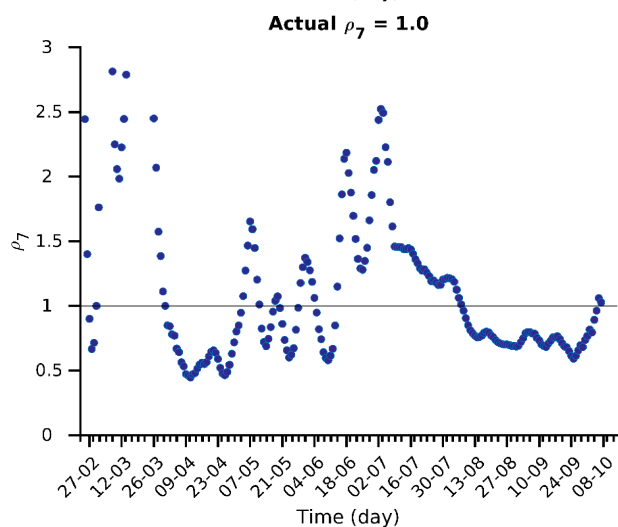
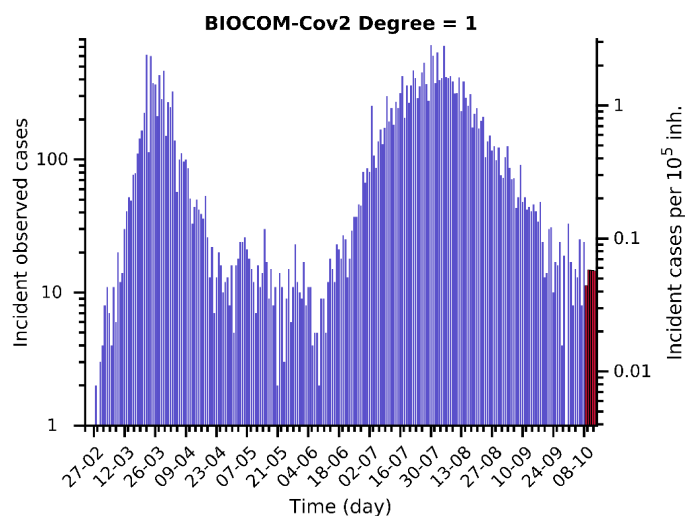
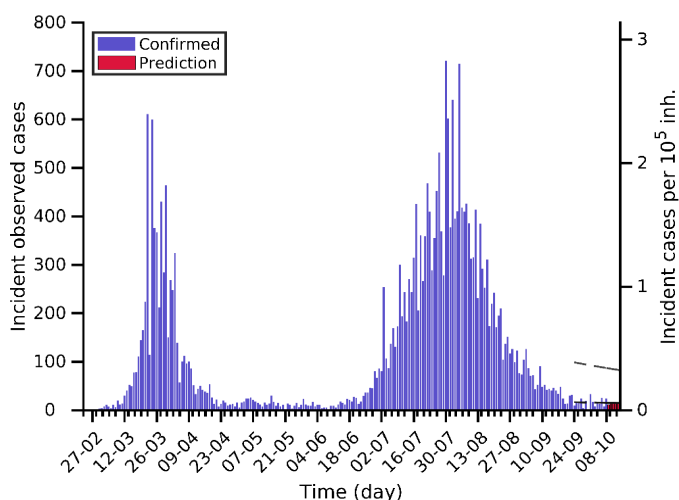


Predictions for next days

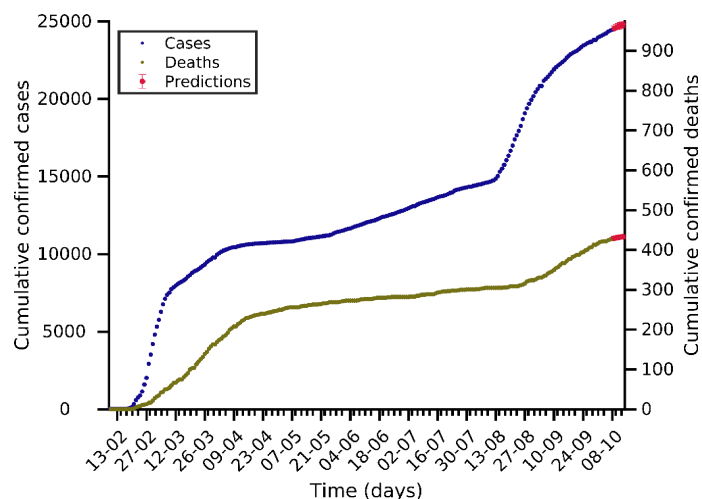
Day	Number of cases	95% Confidence Interval
09-10-2020	27217 (+11)	[27206 - 27277]
11-10-2020	27247 (+15)	[27206 - 27309]
13-10-2020	27276 (+15)	[27210 - 27342]

Current indicators

A ₁₄	EPG	CFR
1	1	4.71 %



South Korea 08-10-2020. Pop: 51.3M. Cumulative incidence: 48/10⁵

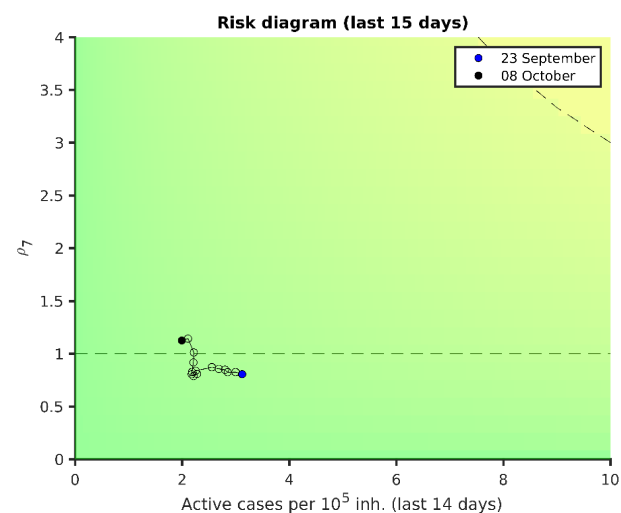
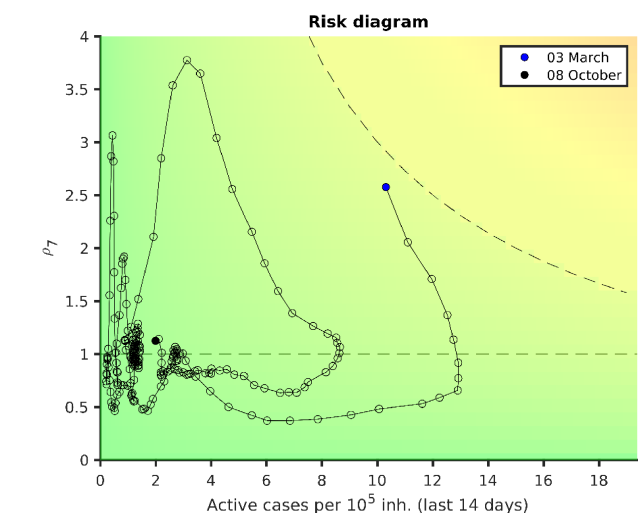
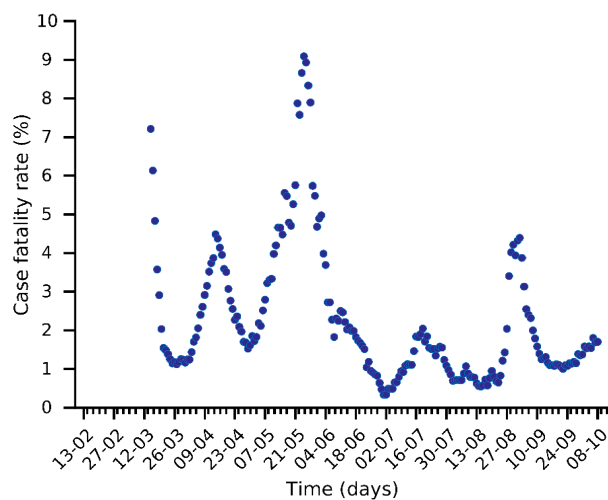
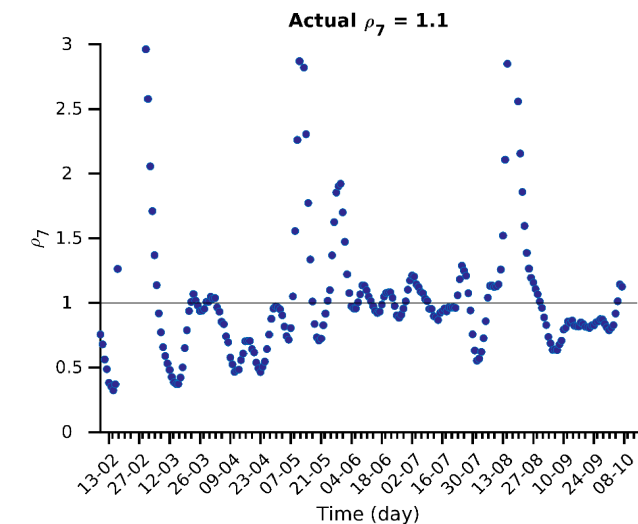
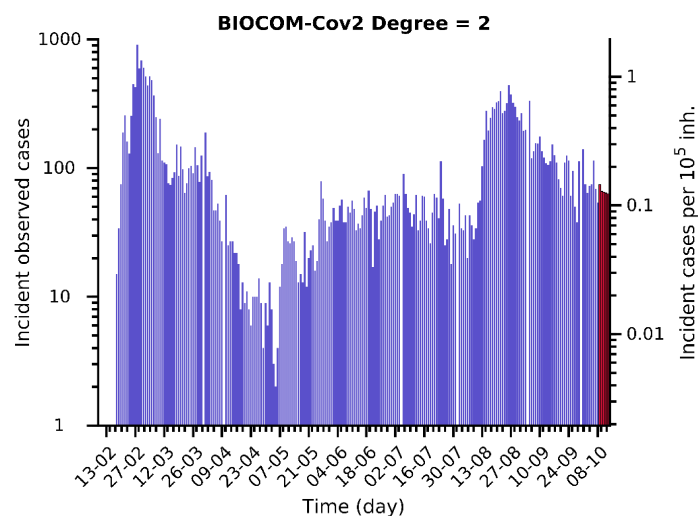
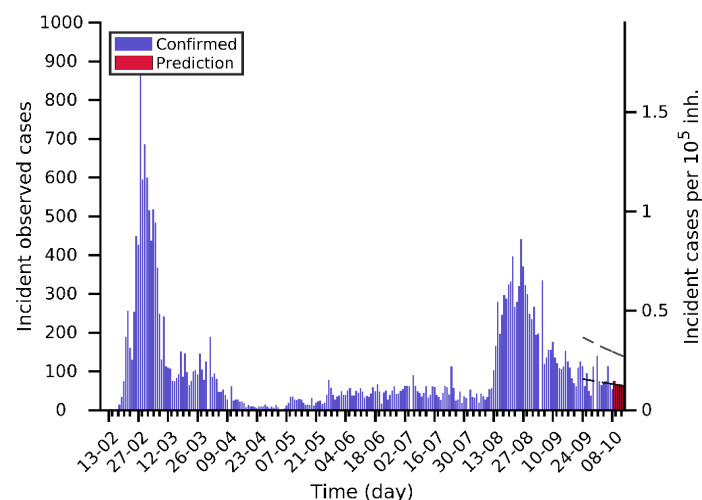


Predictions for next days

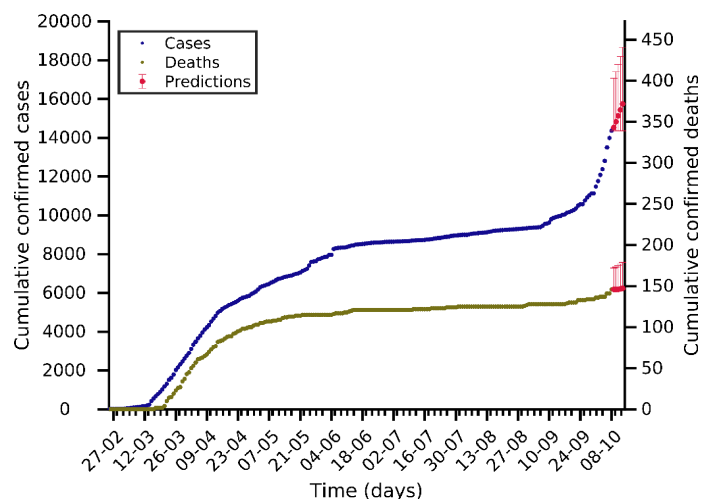
Day	Number of cases	95% Confidence Interval
09-10-2020	24550 (+74)	[24476 - 24717]
11-10-2020	24681 (+65)	[24509 - 24854]
13-10-2020	24809 (+63)	[24624 - 24994]

Current indicators

A ₁₄	EPG	CFR
2	2	1.70 %



Malaysia 08-10-2020. Pop: 32.4M. Cumulative incidence: 44/10⁵

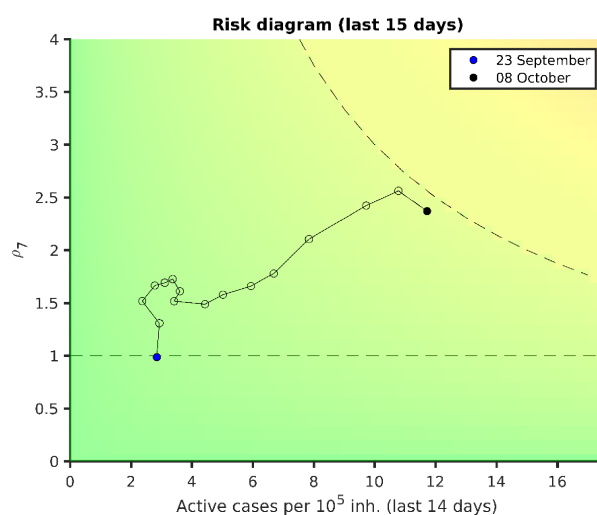
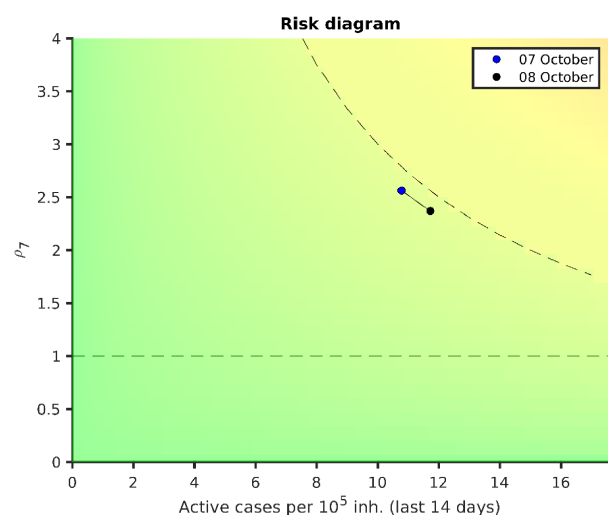
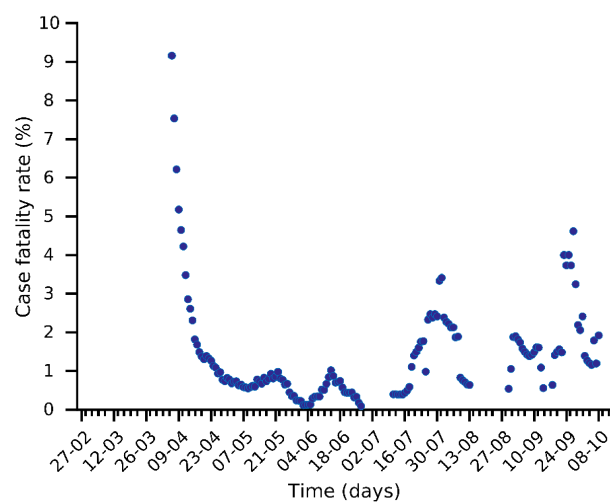
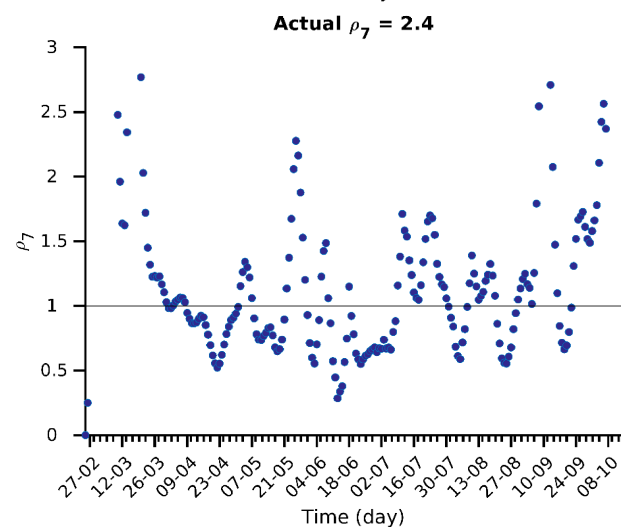
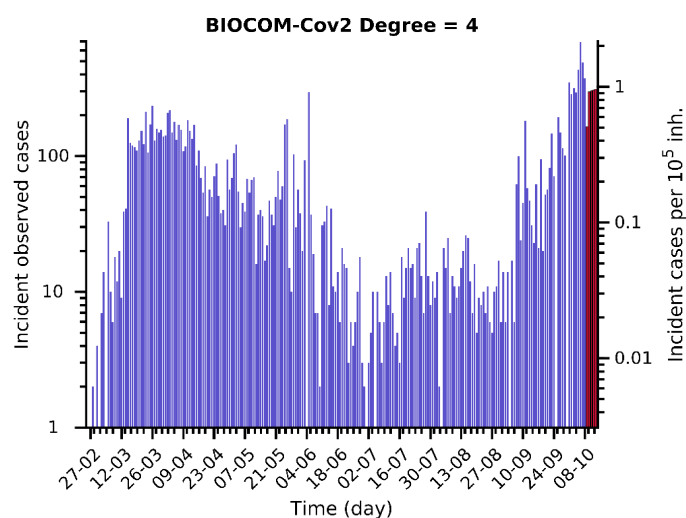
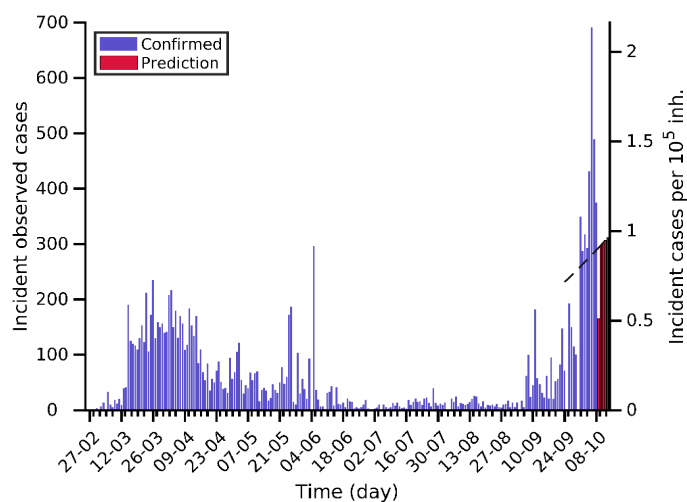


Predictions for next days

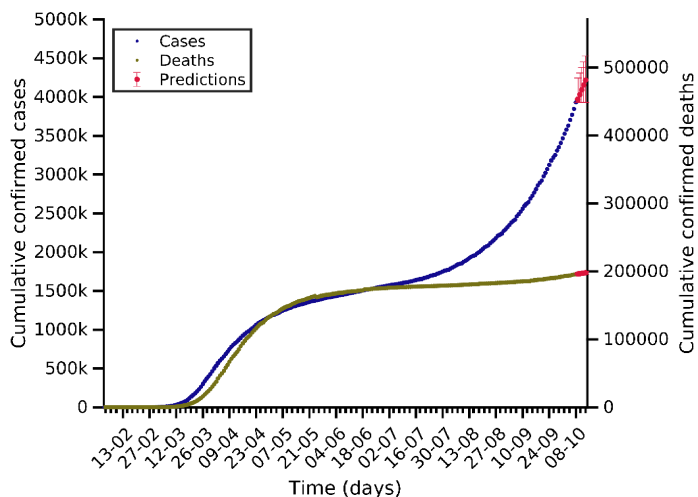
Day	Number of cases	95% Confidence Interval
09-10-2020	14533 (+165)	[14368 - 17069]
11-10-2020	15133 (+302)	[14368 - 17786]
13-10-2020	15751 (+311)	[14368 - 18674]

Current indicators

A ₁₄	EPG	CFR
12	28	1.92 %



Andorra 08-10-2020. Pop: 0.1M. Cumulative incidence: 3324/10⁵

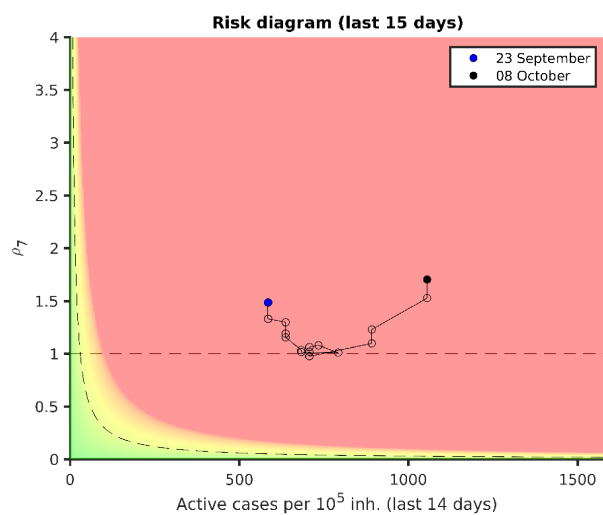
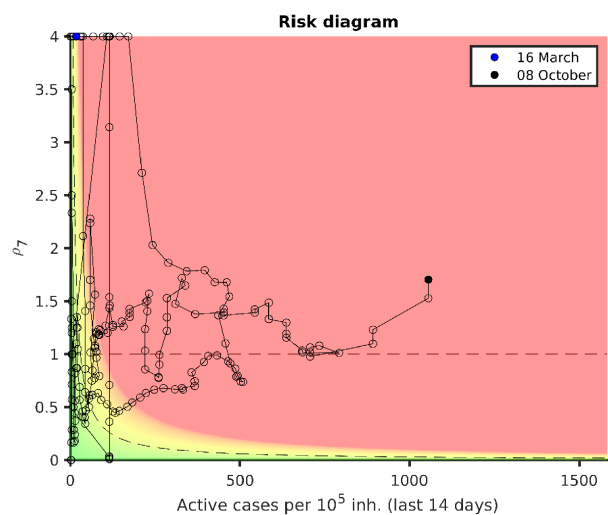
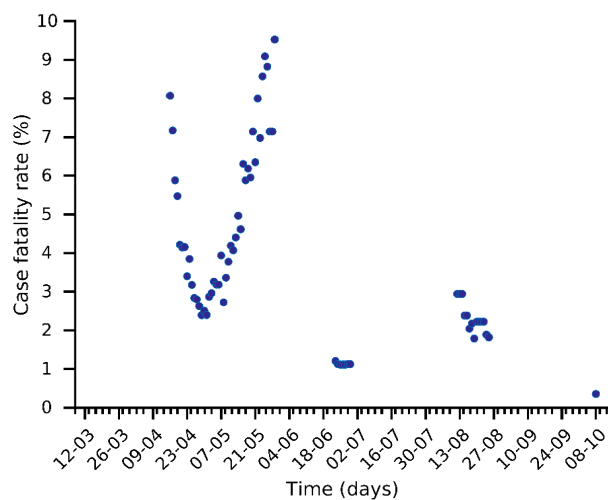
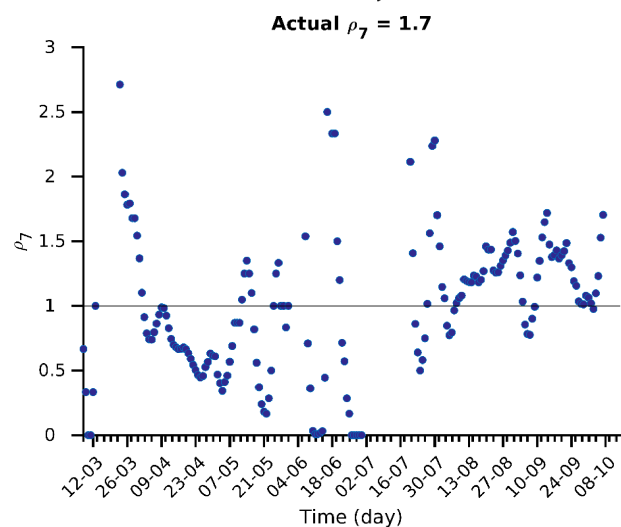
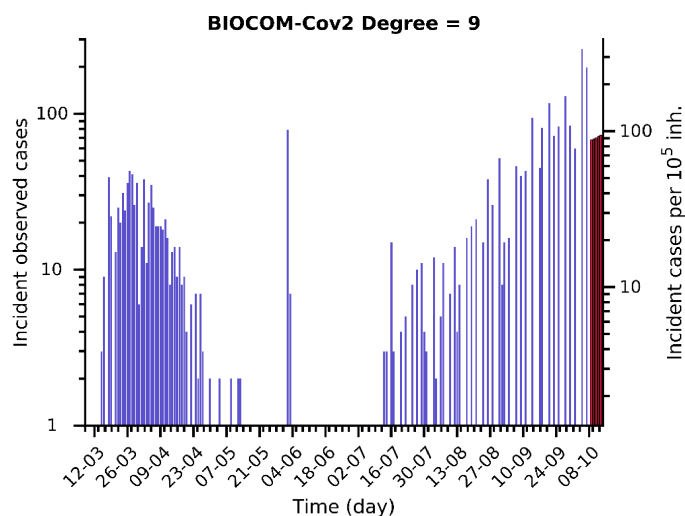
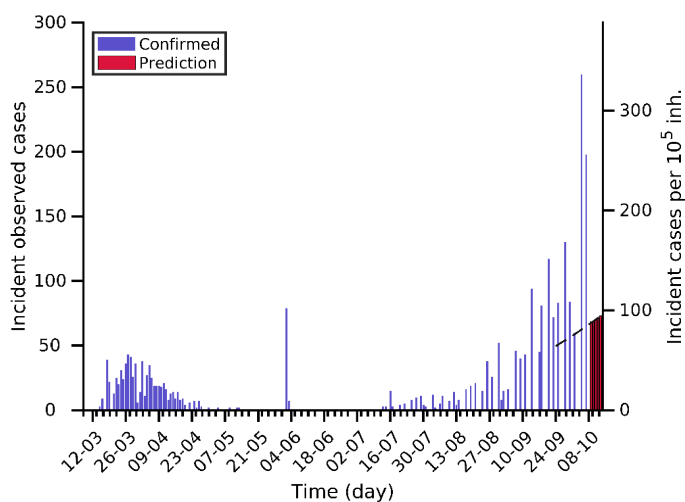


Predictions for next days

Day	Number of cases	95% Confidence Interval
09-10-2020	3970564 (+37638)	[3932926 - 4246284]
11-10-2020	4092903 (+61452)	[3932926 - 4380714]
13-10-2020	4217499 (+62580)	[3932926 - 4532294]

Current indicators

A ₁₄	EPG	CFR
153	193	1.36 %



Methods

Methods

(1) Data source

Data are daily obtained from European Centre for Disease Prevention and Control (ECDC)⁵ and country official sources (when indicated). Daily data comprise, among others: total confirmed cases, total confirmed new cases, total deaths, total new deaths. It must be considered that the report is always providing data from previous day. In the document we use the date at which the datapoint is assumed to belong, i.e., report from 15/03/2020 is giving data from 14/03/2020, the latter being used in the subsequent analysis.

(2) Data processing and plotting

Data are initially processed with Matlab in order to update timeseries, i.e., last datapoints are added to historical sequences. These timeseries are plotted for individual countries and for the UE+EFTA+UK as a whole:

- ✓ Number of cumulative confirmed cases
- ✓ Number of reported new cases
- ✓ Number of cumulative deaths

Then, two indicators are calculated and plotted, too:

- ✓ Case fatality rate: number of cumulative deaths divided by the number of cumulative confirmed cases, and reported as a percentage; it is an indirect indicator of the diagnostic level.
- ✓ ρ : this variable is related with the reproduction number, i.e., with the number of new infections caused by a single case. It is evaluated as follows for the day before last report ($t-1$):

$$\rho(t-1) = \frac{N_{new}(t) + N_{new}(t-1) + N_{new}(t-2)}{N_{new}(t-5) + N_{new}(t-6) + N_{new}(t-7)}$$

where $N_{new}(t)$ is the number of new confirmed cases at day t after applying a 7-day moving average to the new cases dataset, so that fluctuations (e.g., weekend effect) are smoothed.

(3) Classification of countries according to their epidemic level: the scale Biocom-Cov

Countries are assigned a degree in the discrete Biocom-Cov scale, which aims to facilitate a simple way of assessing the situation of the country. It is based on the level of daily new cases per 100,000 inhabitants as follows:

Pandemic degree	Daily new incident cases per 10 ⁵ inh.
0	0
1	0-0.1
2	0.1-0.5
3	0.5-1.25
4	1.25-2
5	2-3
6	3-5
7	5-8
8	8-14
9	>14

⁵ <https://www.ecdc.europa.eu/en/geographical-distribution-2019-ncov-cases>

(4) Fitting a mathematical model to data

Previous studies have shown that Gompertz model⁶ correctly describes the Covid-19 epidemic in all analysed countries. It is an empirical model that starts with an exponential growth but that gradually decreases its specific growth rate. Therefore, it is adequate for describing an epidemic wave that is characterized by an initial exponential growth but a progressive decrease in spreading velocity provided that appropriate control measures are applied. Once in the tail, predictions work but the meaning of parameters is lost.

Gompertz model is described by the equation:

$$N(t) = K e^{-\ln\left(\frac{K}{N_0}\right) \cdot e^{-a \cdot (t-t_0)}}$$

where $N(t)$ is the cumulated number of confirmed cases at t (in days), and N_0 is the number of cumulated cases the day at day t_0 . The model has two parameters:

- ✓ a is the velocity at which specific spreading rate is slowing down;
- ✓ K is the expected final number of cumulated cases at the end of the epidemic.

This model is fitted to reported cumulative cases of the UE and of countries that accomplish two criteria: 4 or more consecutive days with more than 100 cumulated cases, and at least one datapoint over 200 cases. Day t_0 is chosen as that one at which $N(t)$ overpasses 100 cases. If more than 15 datapoints that accomplish the stated criteria are available, only the last 15 points are used. The fitting is done using Matlab's Curve Fitting package with Nonlinear Least Squares method, which also provides confidence intervals of fitted parameters (a and K) and the R^2 of the fitting. At the initial stages the dynamics is exponential and K cannot be correctly evaluated. In fact, at this stage the most relevant parameter is a .

It is worth to mention that the simplicity of this model and the lack of previous assumptions about the Covid-19 behaviour make it appropriate for universal use, i.e., it can be fitted to any country independently of its socioeconomic context and control strategy. Then, the model is capable of quantifying the observed dynamics in an objective and standard manner and predicting short-term tendencies.

(5) Using the model for predicting short-term tendencies

The model is finally used for a short-term prediction of the evolution of the cumulated number of cases (3-5 days). The confidence interval of predictions is assessed with the Matlab function `predint`, with a 99% confidence level. These predictions are shown in the plots as red dots with corresponding error bar. For series longer than 9 timepoints, last 3 points are weighted in the fitting so that changes in tendencies are well captured by the model.

(6) Estimating non-diagnosed cases

Lethality of Covid-19 has been estimated at around 1 % for Republic of Korea and the Diamond Princess cruise. Besides, median duration of viral shedding after Covid-19 onset has been estimated at 18.5 days for non-survivors⁷ in a retrospective study in Wuhan. These data allow for an estimation of total number of cases, considering that the number of deaths at certain moment should be about 1 % of total cases 18.5 days before. This is valid for estimating cases of countries at stage II, since in stage I the deaths would be mostly

⁶ Madden LV. Quantification of disease progression. *Protection Ecology* 1980; **2**: 159-176.

⁷ Zhou et al., 2020. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. *The Lancet*; March 9, doi: 10.1016/S0140-6736(20)30566-3

due to the incidence at the country from which they were imported. We establish a threshold of 50 reported cases before starting this estimation.

Reported deaths are passed through a moving average filter of 5 points in order to smooth tendencies. Then, the corresponding number of cases is found assuming the 1 % lethality. Finally, these cases are distributed between 18 and 19 days before each one.